

MLPA STAFF NOTE: The attached analysis of the July 2001 MLPA Initial Draft Concepts was released in October 2001.

From: Mike Osmond [mailto:ozwhale@mac.com]

Sent: Friday, October 14, 2005 4:08 PM

To: MLPAComments@resources.ca.gov

Subject: MLPAComments: Public comment

October 14, 2005

MLPA Initiative

California Resources Agency

1416 Ninth Street, Suite 1311

Sacramento, CA 95814

Via Email to MLPAComments @resources.ca.gov

Dear MLPA Initiative Staff:

World Wildlife Fund would like to submit as public comment a review by several scientists of the first set of draft MPA concept maps (those prepared by the original MLPA Master Plan Science Team in 2001). Note that the rules of thumb used by these scientists for their analysis are compatible with, though not identical to, the guidelines in the MLPA Framework.

Note that the authors of this review were evaluating the biological merits of the draft concept prepared by the Master Plan Science Team, not the process used to arrive at that concept. We believe the MLPA staff and the Department of Fish and Game have addressed many, if not all, of the process concerns that arose in that first round. Now that there is a new, inclusive public involvement process, as well as a process for evaluating proposals, we thought that a scientific review and gap analysis of that first set of maps could be useful for anyone who is considering alternative ways to design sites and networks that meet the MLPA goals and guidelines

We'd like this information to be available for members of the RSG and the public. Thank you for the opportunity to comment.

Mike Osmond

World Wildlife Fund

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**Analysis and Evaluation of the
Draft Marine Protected Area Network
For California State Waters**

**Proposed by
The California Department of Fish and Game
Marine Life Protection Act Master Plan Team**

Evaluated by:

Dr. Robert Warner
Department of Ecology, Evolution and Marine Biology
University of California at Santa Barbara

Dr. Mark Carr
Department of Biology
University of California at Santa Cruz

Dr. Craig Syms

Dr. Steve Morgan
Bodega Marine Laboratory

Dr. Paul Dayton

Dr. Satie Airame
Channel Islands National Marine Sanctuary
Santa Barbara, California

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Analysis and Evaluation of the Draft Marine Protected Area Network For California State Waters

Background

In accordance with the Marine Life Protection Act (MLPA), the California Department of Fish and Game (CDFG) convened the MLPA Master Plan Team to develop and recommend a network of Marine Protected Areas (MPAs) that would fulfill the objectives of the Act. At the time of this report, the MLPA Master Plan Team is disseminating their *initial* proposal at a series of public hearings and on the Department's "Initial Draft Concepts" web page (<http://www.dfg.ca.gov/mrd/mlpa/concepts.html>). The purpose of these hearings is to consider feedback from stakeholders for further development of the initial design of the MPA network. The goals, guidelines, design criteria, initial designations and process for developing the MPA network are identified on the Department's "Initial Draft Concepts" web page. The purpose of our analysis of the MLPA Master Plan Team's initial network design is to evaluate how well the proposed network meets the objectives, goals and design criteria of the MLPA Act. We understand that our analyses and recommendations may be considered by the Natural Resources Defense Council (NRDC) and the World Wildlife Fund (WWF) in their response to the proposed network design and disseminated to other interested parties.

The geographic region throughout which the MPA network is being considered is defined by Department's jurisdiction and extends along the entire coast of California from the northern to southern borders and around the offshore islands from mean high water along the shoreline to 3 miles offshore. To facilitate both regional allocation of the state-wide MPA network and a regional focus for public hearings and stakeholder input, the Master Plan Team delimited four regions along the California coast: Northern, Northern Central, Southern Central, and Southern. Maps of each of these regions are available at the MLPA web site.

The Master Plan Team defined three categories of Marine Protected Areas (MPAs), each of which are allocated throughout each region. The categories are defined by broad objectives, which in turn define the restrictions on human activities and allowable uses within each. The goals of each of the three MPA categories are described on the "Definitions" page at the MLPA web site. The three categories are identified below in order from most restrictive to least restrictive along with the Department's designated restrictions and allowable uses. We have underlined the salient restrictions of each for emphasis and provided *our general interpretation* of the three categories to clarify their distinctions.

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1. State Marine Reserve (SMR)

Restrictions: it is unlawful to injure, damage, take or possess any living, geological or cultural marine resource, except under a permit or specific authorization from the managing agency for research, restoration or monitoring purposes. While, to the extent feasible, the area shall be open to the public for managed enjoyment and study, the area shall be maintained to the extent practicable in an undisturbed and unpolluted state. Therefore, access and use (such as walking, swimming, boating and diving) may be restricted to protect marine resources.

Allowable uses: research, restoration and monitoring may be permitted by the managing agency. Educational activities and other forms of non-consumptive human use may be permitted by the designating entity or managing agency in a manner consistent with the protection of all marine resources.

Interpretation: Although public and scientific access may or may not be permitted, no consumptive human use, either recreational or commercial is allowed.

2. State Marine Park (SMP)

Restrictions: it is unlawful to injure, damage, take or possess any living or nonliving marine resources for commercial exploitation purposes. Any human use that would compromise protection of the species of interest, natural community or habitat, or geological, cultural or recreational features, may be restricted by the designating entity or managing agency.

Allowable uses: all other uses are allowed, including scientific collection with a permit, research, monitoring and public recreation (including recreational harvest, unless otherwise restricted). Public use, enjoyment and education are encouraged, in a manner consistent with protecting resource values.

Interpretation: All uses other than commercial harvest are allowed.

3. State Marine Conservation Area (SMCA)

Restrictions: it is unlawful to injure, damage, take or possess any specified living, geological or cultural marine resources for certain commercial, recreational, or a combination of commercial and recreational purposes. In general, any commercial and/or recreational uses that would compromise protection of the species of interest, natural community, habitat or geological features may be restricted by the designating entity or managing agency.

Allowable uses: research, education and recreational activities, and certain commercial and recreational harvest of marine resources may be permitted.

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Interpretation: Certain commercial and recreational harvest of marine resources may be permitted.

Marine Life Protection Act Goals

As identified in the MLPA, the overall goals of the MPA network are to:

1. Protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems;
2. Help sustain, conserve and protect marine life populations, including those of economic value, and rebuild those that are depleted;
3. Improve recreational, educational, and study opportunities provided by marine ecosystems that are subject to minimal human disturbance, and to manage these uses in a manner consistent with protecting biodiversity;
4. Protect marine natural heritage, including protection of representative and unique marine life habitats in California waters for their intrinsic value;
5. Ensure that California's MPAs have clearly defined objectives, effective management measures, and adequate enforcement, and are based on sound scientific guidelines;
6. Ensure that the State's MPAs are designed and managed, to the extent possible, as a network.

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Approach

Each of the goals of the MLPA identifies a suite of more specific objectives. This report is structured to address each of these general goals and specific objectives. We addressed as many of these objectives as the available data and time allowed. We also were careful to clarify the uncertainty and constraints in both the Master Plan Team's and our ability to assess how well the proposed MPA network meets these goals and objectives. For each region, we evaluated the Master Plan proposal with respect to the following six criteria.

1. Percentage of area set aside for the MPA network

The MLPA requires that habitats important to marine species and ecosystems be sufficiently represented within the network of proposed MPAs. Sufficient representation implies that each habitat is represented in proportion to its relative abundance along the coast and protected areas within the network act to restore and sustain local and regional populations. Numerous scientific studies recommend setting aside between 20 and 50 percent of suitable habitats in a network of protected areas to achieve goals for biodiversity (where large MPAs provide greatest benefits) and fisheries (where moderate MPAs convey maximum benefit – see NRC 2001).

2. Adequacy of protection within MPAs

Proposed MPAs will reduce mortality of some or all species within the MPAs. However different MPA designations (SMR, SMP, and SMCA) will impact populations, communities and ecosystems in different ways. Thus, it is important to discuss the extent to which these designations actually meet the goal of protection as mandated by the MLPA. Two of the MPA designations (SMP and SMCA) allow some extraction of organisms, and the regulations specifying just what can be extracted vary from site to site. Marine parks (SMPs) allow some recreational fishing, thus reducing the rate of mortality on commercially fished species and some recreationally fished species. Marine conservation areas (SMCAs) allow limited recreational and commercial fishing. In SMCAs, some species will be protected whereas others will not. Limited commercial and recreational extraction defeats the goals for biodiversity protection within marine protected areas. Areas open to limited fishing are not likely to function as intact ecosystems, and thus SMPs and SMCAs may not contribute significantly to the MLPA goal of protecting intact ecosystems.

Marine reserves (SMRs) restrict all fishing activity, thus reducing the mortality of fished species within reserves. No-take marine reserves (SMR) are successful because the organisms within them exist in dense populations of large individuals, leading to high exportable reproductive output.

Although various levels of protection afford better opportunities for research and evaluation, the experimental aspects of the proposed MPA network should not interfere

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with the primary goals of biodiversity preservation and support for sustainable extractive activities outside of reserves.

3. Size of individual MPAs

Establishing reserve size requires numerous trade-offs between export function of the reserve, population viability within the reserve, potential impacts of disturbance on populations and habitats within the reserve, and the feasibility of enforcement of reserve regulations. Small reserves may not support populations that are large enough to persist, especially for mobile species that often cross reserve boundaries. If populations cannot sustain themselves, the reserve will not serve fishery, conservation or other objectives dependent on these species. In addition, small reserves are more vulnerable to periodic disturbances such as extreme low tides or algal blooms, which could wipe out a population in a small reserve in a single event. Very small reserves will function only to the degree that essential linkages to other habitats are maintained. Larger reserves will probably be needed to protect rare and fragmented habitats. However, moderate reserves with large edge to area ratios will contribute more to export of larvae and spillover of adults than very large reserves. Goals for conservation of biodiversity and fisheries can be achieved simultaneously with a marine protected area network that includes a sufficient amount of representative and unique marine habitats.

4. Spacing between MPAs

Very large MPAs offer potential increased local production contributing to local recruitment, thus enhancing their function in restoring and sustaining biodiversity. However, very large MPAs may have large economic impacts and cause displacement and congestion in crowded fisheries. An alternative to designating large MPAs is to establish MPA networks, where export from one reserve may be protected in Año ther. To function properly, distances between reserves should be within the potential range of dispersal of species of particular concern. Large gaps between fully protected marine reserves (SMRs) in the MPA network should be avoided, especially if suitable habitat exists within the gaps.

It is essential that network design should consider dispersal distances and protection of larval habitat. Populations in isolated reserves will only be self-sustaining where there is significant retention of offspring. In contrast, there must be substantial export of offspring for fishery enhancement to occur. High fecundity of most marine species increases the probability that offspring may be exported to replenish fishing grounds.

5. Habitat inclusion

The MLPA requires that habitats important to marine species and ecosystems be sufficiently represented within the network of proposed MPAs. Habitats can be identified by (1) depth range, (2) substratum type (e.g., rocky reefs), (3) ocean graphic conditions (e.g., upwelling centers, eddies), (4) key biotic components (e.g., kelp forests), (5) other characteristic features (e.g., submarine canyons), and (6) combinations of all of

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the above. Shallow rocky reef habitat (0-30 m depth) is the most important habitat for inclusion in the MPA network because it contains the greatest number of species of concern listed by the Master Plan Team and the Nearshore Fishery Management Plan (<http://www.dfg.ca.gov/mrd/mlma/managementplans/nearshore.html>).

6. Practicality

The success of MPAs for protecting habitats and biodiversity depends of the effectiveness of MPA regulations to reduce mortality of fished and by-catch species and habitat disturbance from fishing gear. Clear boundaries of the proposed MPAs (including latitude and longitude lines and clearly discernable features of the landscape) will help users determine MPA boundaries. Additionally, an effort should be made to establish MPAs where there already is an onsite presence to enforce associated regulations. However, safe harbors and areas near ports should remain open for safety and convenience of users.

Sources of data

Our analyses and evaluation are based on 5 main sources of information.

1. The proposed network design illustrated and described on the California Department of Fish and Game's web page (identified above).
2. Discussions with the individuals responsible for the proposed network design in each region and their presentations at the relevant public hearings. Mary Yoklavich and Dr. Ralph Larson coordinated the mapping effort in the southern central region. Dr. Steven Gaines, Dr. Steven Murray, Dan Richards, and John Ugoretz coordinated the mapping effort in the southern region.
3. Discussion with and data acquired from Dr. Nancy Wright, head of the Marine Division's GIS Laboratory in Monterey, California. Dr. Wright was responsible for constructing the resource distribution and exploitation maps used by the Master Plan Team in their design development.
4. Analyses conducted by Dr. Satie Airame from information provided by Dr. Wright.
5. Analyses of total and relative region-wide kelp area within MPA designation based upon aerial estimates provided by Dr. Wright's (CDFG) lab.

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MARINE LIFE PROTECTION ACT MASTER PLAN

Proposed reserve network: MLPA Master Plan

The Master Plan Team identified, redefined, and proposed 79 MPA sites throughout California State waters (Table 1). The network of MPAs includes approximately 20.1% (or 2251.1 km²) of the 11,216.1 km² under consideration within State waters. Approximately 7.8% (or 869.8 km²) of State marine waters is proposed for protection in 41 state marine reserves (SMRs). Limited commercial and recreational fishing (within 24 SMCAs) is proposed in 9.7% (or 1085.4 km²) and limited recreational fishing (within 14 SMPs) is proposed within 2.6% (or 295.9 km²) of the area protected within the proposed network of MPAs. Several of these areas (SMCAs, in particular) offer minimal protection for species contained within them because they allow fishing on many species that are closely linked, as prey or predators, to species these areas aim to protect.

Table 1 summarizes key features of each proposed MPA site, including MPA type, size, depth range, habitat composition, and proposed regulations. The Master Planning Team's description of each MPA (<http://www.dfg.ca.gov/mrd/mlpa/concepts.html>) includes a brief summary of the general setting and environmental features for each site including proposed boundaries, proposed regulations, whether or not the area encompasses an existing MPA of some type, and any special ecological features.

The southern region contains 14 of the 41 proposed fully protected marine reserves (more than any other region), comprising 12% of that region's available area. The northern region contains 7.5 proposed SMRs (8.6% of the available area in that region) whereas the northern central and southern central regions contain 10.9 SMRs (4% of the region) and 8.6 SMRs (4.2% of the region), respectively. Fully protected marine reserves are one of the most effective tools for protecting habitats and species. Thus, an attempt should be made to increase the number of SMRs in regions where the percentage of area protected is much less than 10%.

The largest state marine park (SMP) is located in the southern central and southern regions (Conception SMP), contributing to relatively large fraction of the southern central region (6.1%) protected in SMPs. Although a greater number of proposed SMPs are located in the northern and southern regions (6 and 5 SMPs, respectively), the fraction of each region protected within SMPs is far less (1.4% and 1.6%, respectively). The northern central region contains only one proposed SMP (Salt Point), comprising 0.4% of the total area available in that region.

More of the 24 SMCAs in the Master Plan proposal are located in the southern central region (N=11.6) than in any other region. The percentage of available area protected in SMCAs in the southern central region is approximately 10.7%. Protection within SMCAs in other regions ranges from 9% in the northern central region to 9.6% in the southern region. State marine conservation areas (SMCAs) provide the least amount of protection for habitats and species of interest. In some cases (e.g. Santa Monica Bay SMCA), proposed regulations provide no additional protection for habitats and species.

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We recommend increasing the level of protection within SMCAs to limit commercial and recreational fishing in regions with relatively little protection within SMRs, particularly the northern central and southern central regions.

It is important to note that the Master Plan Team divided California state waters into 4 major regions in accordance with large-scale biogeographical patterns. Several of the proposed protected areas, including Point Arena SMR, Año Nuevo SMR and SMCA, and Conception SMP, are located on the boundary between two regions. Dividing these protected areas into two regions makes it difficult to determine the exact number of protected areas and the size of protected areas in each region. We estimated the number of protected areas in each region as the number of protected areas completely contained within the region plus the fraction of protected areas contained within the region (e.g. 7.5 SMRs in the northern region). Thus, simple addition of the numbers of SMRs in each region equals the total number of SMRs in the draft Master Plan. Dividing a single protected area between two regions contributes to confusion about the actual number of proposed protected areas in the region and in the state. We recommend that the Master Plan Team slightly shift the somewhat arbitrary boundary between the regions such that all proposed protected areas are included in their entirety in a single region.

Adequacy of protection: MLPA Master Plan

The network of MPAs is designed primarily to protect sedentary fishes, invertebrates and kelp, all of which primarily are associated with rocky substrate. Sedentary species of ecological and economic importance will be provided with a larger measure of protection than they currently have in State waters.

Red urchins, abalone, rockfishes, lingcod and cabezon that presently sustain considerable fishing pressure should benefit most from the establishment of the proposed network. Nearshore species will receive more protection than will deeper water species, because the MPAs largely occur within one mile from shore.

Several of the proposed SMRs are sufficiently small that their protective value is questionable for populations of the more mobile finfishes they are targeted to protect. Some small SMRs are surrounded by areas in which fishing is permitted. In order to achieve minimal levels of protection for species of concern, we recommend increasing the area of small marine reserves or restricting all but pelagic fishing in areas surrounding small SMRs.

In the northern central region, salmon will be provided with far less protection than other species, because both commercial and recreational fishing is allowed throughout most of the area set-aside for the MPA network. Salmon fishing is extremely popular in the north central region, and the Master Plan Team has recognized that closing MPAs to salmon fishing likely would prove to be very difficult.

Migratory species will receive less demonstrable benefit from the network than will species that remain within MPA boundaries. However, they still may benefit by spending a disproportionate amount of time feeding in protected, productive areas.

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Many of the SMCAs in the proposed network specifically allow the commercial take of “pelagic” or “transitory” finfishes. In most cases, these are identified as “salmon, albacore, sardine, anchovy, herring, and mackerel”. The ecological significance (i.e. the extent to which these species interact directly or indirectly with other species in an MPA ecosystem) varies among these species. Because of their highly transitory behavior, the extent to which some of these species influence the benthic communities within an MPA is considered by many to be minimal (e.g., salmon and albacore). Because of the economic and social significance of fishing for these species, it may be practical to exclude them from protection within MPAs (as recommended by the Master Team) unless MPAs encompass areas in which these species accumulate and are highly vulnerable to exploitation (e.g., salmon at river mouths). Species such as “baitfish” (e.g., anchovies, herring, mackerel), however, are known to be consumed by benthic species targeted for protection within MPAs (e.g., rockfishes) and other important predators in these ecosystems (e.g., lingcod, halibut). Also, their residence time within an MPA area is likely to be much greater than that of highly transitory species. Because of their documented importance as an energy source for benthic species, these should be protected within MPAs that aim to safeguard benthic species or biodiversity. Moreover, exclusions in this area and throughout all four regions should be *strictly* limited to “pelagic” or “transitory” finfishes (salmon and albacore), allowing no exemptions from protection for any benthic migratory species such as halibut, crabs and lingcod.

MPA Size: MLPA Master Plan

Many proposed MPAs are of adequate size to allow some ecosystem recovery and export. The average size of SMCAs (45.2 km²) is much larger than the average sizes of SMPs (21.1 km²) and SMRs (21.2 km²). Of the three designations, SMCAs provide the least protection for habitats and species. Many of the SMRs and the SMP are not large enough to contain the home ranges of mobile adults, and fewer larvae will be produced inside these MPAs to seed adjacent areas that are fished.

The median size of the proposed reserves statewide is 14.7 km². Fifteen of 41 marine reserves are probably too small (less than 10 km²) to protect the species for which they were designed. We use 10 km² in this analysis as the minimum size likely to support biodiversity and the specific species the proposed SMRs were designed to protect. That estimated threshold takes into account the home ranges of adults of a variety of fished species and a range of larval dispersal distances. Many species disperse distances greater than the length or width of a 10 km² area. However, a network of MPAs can be designed to reduce fishing mortality for species of concern by locating MPAs around preferred habitats for these species (e.g. nearshore rocky reefs). While mortality for some or all species will be reduced in areas less than 10 km², those areas are unlikely to contain the average home ranges of mature members of the more mobile species. Lack of full protection for mobile species will result in smaller overall populations and smaller average individual sizes, thus limiting the potential for larval export from small MPAs.

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The smallest SMRs are located in the northern central and southern central regions, where the Master Plan Team proposed a median reserve size of 4.8 km² and 7.1 km², respectively. Fully protected marine reserves are much larger in the northern and southern regions, with median sizes of 26.6 km² and 26.1 km², respectively (collectively comprising 19% and 23% of the regions). Additional area for SMRs should be established in the northern central and southern central regions. In particular, additional area for SMRs should be established in cases when small SMRs are not buffered by other MPA designations, or small SMRs are buffered only by SMCAs that do not restrict recreational take. Extending the offshore boundaries of small MPAs to the three-mile State boundary would increase the level of protection for habitats and biodiversity.

Small marine reserves:

• Mac Kerricher SMR	1.8 km ²
• Del Mar Point SMR	0.3 km ²
• Salt Point SMR	0.2 km ²
• Fort Ross SMR	1.0 km ²
• Bodega SMR	5.9 km ²
• Bird Rock SMR	3.8 km ²
• Natural Bridges SMR	6.8 km ²
• Hopkins SMR	0.9 km ²
• Julia Pfeiffer Burns SMR	7.1 km ²
• Salmon Creek SMR	9.6 km ²
• Point Buchon SMR	8.7 km ²
• Lunada Bay SMR	2.6 km ²
• Point Fermin SMR	0.6 km ²
• Dana Point SMR	9.0 km ²
• Wrigley Institute of Environment SMR (Santa Catalina)	8.1 km ²

The Estero Americano SMR and Estero de San Antonio SMR are also small but only because the sizes of the esteros are small.

In addition to total size, dimensions of marine reserves impact their potential contribution to biodiversity conservation. Maximum protection can be achieved with a circular reserve design, minimizing the perimeter to area ratio. Long and narrow reserves may not effectively contribute to conservation because organisms with short dispersal distances are likely to move outside narrow reserves into fished areas. For example, Cambria SMR is substantial (17.8 km²), but the length of this reserve is short (3.3 km) and the adjacent SMCA allows recreational fishing, reducing the likelihood that populations will be protected sufficiently in Cambria SMR.

Most proposed marine parks are very small; half of the marine parks are less than 6.8 km². Ten of 14 marine parks are probably too small to protect the species they were

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designed to protect (less than 10 km²). Conception SMP, which overlaps the southern central and southern regions, is the largest of the SMPs (190.2 km²). Only one small marine park is located in the northern central region, Salt Point SMP (7.1 km²). Additional area for SMPs should be established in the northern central regions. Although 5 SMPs are located in the southern region, the median park size is the smallest of all regions (4.0 km²). However, the large number and size of fully protected marine reserves (SMRs) in the southern region offsets the minimal protection afforded to habitats and species through designation of SMPs.

Small marine parks:

• Reading Rock SMP	3.6 km ²
• Sinkyone SMP	8.3 km ²
• De Haven SMP	9.0 km ²
• Russian Gulch SMP	0.6 km ²
• Van Damme SMP	0.4 km ²
• Greenwood SMP	2.6 km ²
• Salt Point SMP	7.1 km ²
• Refugio SMP	3.7 km ²
• Abalone Cove SMP	0.3 km ²
• Farnsworth SMP (Santa Catalina)	4.3 km ²

In contrast, the median size of SMCAs is 34 km² and only one SMCAs is less than 10 km² (Laguna Intertidal at 2.7 km²). Santa Monica Bay SMCA, in the southern region, is the largest of the SMCAs (236.9 km²), however this designation does not increase the level of protection for habitats and species within Santa Monica Bay. The smallest SMCA, Laguna Intertidal SMCA, is also located in the southern region. The greatest number of SMCAs is located in the southern central region (N=11.6). However, the percent protection within SMCAs in the southern central region (10.7%) is only slightly greater than the percent protection within SMCAs in the other regions (ranging from 9% in the northern central region to 9.6% in the southern region).

MPA spacing: MLPA Master Plan

Proposed MPAs are about 13 km apart on average, which should be sufficient for network functionality. However, some of the MPAs (particularly SMCAs and SMPs) do not afford sufficient protection to all species of concern. Proposed regulations restrict commercial fishing in Sinkyone and De Haven SMPs, but these areas are too small to protect many nearshore fish species, leaving a gap of 75.2 km from the Lost Coast SMR to Point Cabrillo SMR. Proposed regulations also restrict commercial fishing in Russian Gulch, Van Damme, and Greenwood SMPs, but these areas are too small to protect many nearshore fish species, leaving a gap of 41.7 km from Point Cabrillo SMR to Point Arena SMR.

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Average distance between fully protected marine reserves (SMRs) (32.2 km) greatly exceeds the average distance between proposed MPAs. The greatest average distances between fully protected marine reserves occur in the northern and southern central regions (42 km and 41.4 km, respectively). The largest gap in protection (108.3 km) is between Cambria SMR and Conception SMP in the southern central region. Another large gap between fully protected marine reserves is between Coal Oil Point SMR and Leo Carrillo SMR in southern region. However, based on the ocean graphic characteristics that affect most species of concern, filling this gap should be a lower priority than others.

Sixteen of 41 fully protected marine reserves are more than 30 km from the next adjacent marine reserve. In this analysis, we use 30 km as a general guideline for the maximum distance between fully protected marine reserves, based on a consideration of average home ranges and dispersal distances for a variety of species.

• Saint George Reef SMR to Patricks Point SMR	75.6 km
• Patricks Point SMR to Eel SMR	47.4 km
• Eel SMR to Kings Range SMR	30.6 km
• Lost Coast SMR to *Mac Kerricher SMR	66.2 km
• Point Cabrillo SMR to *Point Arena SMR	41.0 km
• Farallon Islands SMR to Fitzgerald SMR	42.5 km
• Fitzgerald SMR to Año Nuevo SMR	38.3 km
• *Natural Bridges SMR to *Point Lobos SMR	37.7 km
• *Point Lobos SMR to *Julia Pfeiffer Burns SMR	45.8 km
• *Big Creek SMR to *Salmon Creek SMR	30.6 km
• *Salmon Creek SMR to Cambria SMR	36.7 km
• Cambria SMR to Conception SMP	108.3 km
• Conception SMP to *Refugio SMR	32.7 km
• Coal Oil Point SMR to Leo Carrillo SMR	90.1 km
• Leo Carrillo SMR to *Lunada Bay SMR	55.6 km
• *Point Fermin SMR to Crystal Cove SMR	41.2 km
• Pendleton SMR to La Jolla SMR	37.0 km

*Probably too small to protect many nearshore fish species

Additional gaps exist because some SMRs are probably too small to protect many nearshore fish species. For example, Del Mar Point SMR, Salt Point SMR, and Fort Ross SMR are all less than 1 km², leaving a gap of 61.8 km from Point Arena SMR to Bodega SMR. In the southern region, Lunada SMR and Point Fermin SMR are all less than 3 km², leaving a gap of 108.9 km between Leo Carrillo SMR and Crystal Cove SMR.

To facilitate a network with ecological connections between MPAs and to improve protection for nearshore finfish, additional SMRs should be designated or additional

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protection should be added to proposed regulations for MPAs that are located in the largest gaps between MPAs proposed in the Master Plan.

Habitat inclusion: MLPA Master Plan

Depth. The proposed network of MPAs primarily protects habitats between the intertidal to the shallow continental shelf (<100 m depth). The area of habitat at different depth intervals protected in MPAs is summarized in Tables 3-5. Approximately 17.8% (or 834.7 km²) of the habitat from 0-30 m is protected by MPAs proposed in the Master Plan, with the majority of the area divided between SMCAs (8.8%) and SMRs (6.7%). Most protection for shallow waters from 0-30 is located in the northern and southern regions (21.7% and 20.7%, respectively). The proposed MPA network provides the least amount of protection to shallow coastal waters (0-30 m) in the northern central and southern central regions (12.8% and 13.6% respectively). Approximately 18.3% (or 1058.9 km²) of the shallow continental shelf is protected in MPAs, with the majority of the area divided between SMCAs (9.2%) and SMRs (6%). State waters contain approximately 945.8 km² of deep continental shelf habitat from 100-200m. Approximately 11% of deep continental shelf in state waters (or 104.3 km²) is protected within no-take marine reserves (SMRs) and additional protection is provided by SMCAs (8.5% or 80.2 km²). Most of the protection from SMRs is in the southern region (75.3 km²) with additional protection in the northern region (19.4 km²) and the southern central region (9.6 km²). Very little protection of deep continental shelf is provided in SMPs (0.9% or 8.8 km²). Extending the offshore boundaries of some of the smaller SMRs to the three-mile State boundary would increase the level of protection for deep continental shelf habitats.

Preservation of key habitats. The specific descriptions of individual MPAs provided by the Planning Team indicate that there is a good mix of habitats included in most areas. Based on the depth distribution data provided by the CDFG, the major deficiency in the overall network is in deeper habitats. Some of this is imposed by the three-mile State boundary, but the deficiency could be ameliorated by extending the borders of many MPAs to the full three-mile limit, as described above.

Although detailed habitat data are not available for most of California waters, historic kelp bed distributions indicate locations of important shallow water rocky habitats. Shallow rocky habitat was given high priority by the Planning Team and the importance of protecting this habitat is justified by the high concentration of biodiversity and high productivity of shallow rocky habitats. The current MPA proposal provides good protection for this priority habitat (Table 6). Approximately 30% of historic kelp beds in State waters are protected within the MPA network, with the majority of the habitat (17%) in SMRs. The most kelp habitat is protected in SMRs in the southern central and southern regions (7.9 km² and 7.6 km², respectively).

There are four major submarine canyons off the coast of northern California and two of them are protected with the proposed MPA network (Table 7): Kings Range SMR and Lost Coast SMR. Portions of the Monterey and Carmel submarine canyons are incorporated into the proposed Soquel Canyon SMCA, Carmel Bay SMP and Point

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Lobos SMCA in the southern central region. Of eight major submarine canyons off the coast of southern California, three (or 38%) are protected with the proposed MPA network: La Jolla SMR, off Rodondo Beach in the Santa Monica Bay SMCA, and portion of the canyon off of Point Dume in the Leo Carillo SMR. As the draft siting proposal is revised, the significant inclusion of this submarine canyon habitat type should be maintained.

Ocean graphic conditions. Many of the MPAs are located at promontories where strong upwelling prevails. Although upwelled nutrients are abundant in surface waters at these sites, production of phytoplankton and then zooplankton may lag there. Strong currents may carry nutrient rich waters to neighboring areas before the water becomes productive. Therefore, these neighboring areas may be more productive than the actual promontories. Strong upwelling also increases the probability of larval transport to other areas and reduces the probability that these areas will be self-sustaining, given that the large majority of marine animals produce larvae. Upwelling jets typically separate from shore usually carrying larvae away from shore to the north of these headlands during prevailing northwesterly winds. Gyres typically are generated in the lee of promontories under these conditions, which entrain larvae and greatly enhance the probability of larval recruitment to these areas. Therefore, extending MPAs to include the leeward side of promontories may ensure that these areas not only supply larvae to other MPAs in the network but sustain themselves. The different ocean graphic conditions on each side of promontories may also result in shifts in community composition and productivity. Thus, including more area in the lee of headlands and between headlands may be advisable from the standpoint of connectivity, sustainability, biodiversity and productivity across the MPA network.

Practicality: MLPA Master Plan

Clarity of boundaries. A good effort has been made to establish clear boundaries of the proposed MPAs that should reduce confusion by fishers. This has been accomplished by using latitude and longitude lines to demarcate MPA boundaries and by using clearly discernable features of the landscape, such promontories and entrances to coves and esteros.

One potential problem area is that the seaward boundary of the MPAs usually is set by distance from shore. This generates an irregular boundary that follows the contour of the coastline, or nested circles (e.g. Farallon Islands) that will be difficult to follow. In order to detect irregular boundaries, boats will require onboard GPS. Although commercial fishers will have a GPS, not all recreational users do and they would be forced to buy one to comply with the new regulations. One solution is to square off these boundaries using latitude and longitude lines.

Onsite presence. A good effort also has been made to establish MPAs where there already is an onsite presence to watch over the MPAs. In the northern region, onsite monitoring and enforcement are already established in or near proposed sites (e.g. MacKerricher SMR. In the northern central region, perhaps the only exceptions are at

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Bird Rock, the Estero Americano and the Estero de San Antonio. Existing long-term monitoring programs and enforcement potential are likely to contribute to the effectiveness of proposed marine protected areas in the southern central region, including Año Nuevo SMR and SMCA, Natural Bridges SMR and SMCA, Hopkins SMR, Pacific Grove SMCA, Point Lobos SMR and SMCA, and Piedras Blancas SMR. Because of the concentration of commercial and recreational fishing in southern California, it is particularly important that proposed protected areas are effectively enforced and monitored. Most proposed sites are located near potential enforcement facilities and many areas are long-term monitoring sites (Carpinteria SMP, Point Fermin SMR, La Jolla SMR, Wrigley Institute of Environmental Science SMR).

Few stretches of the California coast are not accessible by road. In the northern region, several proposed protected areas (including Kings Range SMR and Lost Coast SMR) are difficult to access by land, and the protected areas are relatively far from major ports. Similarly, the shorelines of Purisima Point SMCA and Concepcion SMP in the southern central region are difficult to access, and relatively far from established ports. From one perspective, their isolation contributes to the level of habitat and species protection of these protected areas. However, it may be difficult to enforce reserve regulations because these protected areas are far from any established onsite presence.

Proximity to ports. Many of the proposed MPAs are situated near ports, which likely will increase the contentiousness of the approval process. In the northern central region, the largest areas protected within the network are near both of the major ports to north of Point Reyes (Point Arena and Bodega Bay). In addition, small MPAs have been located at most of the public access points along the coast. Although these areas are prime habitat for inclusion in the MPA network, their inclusion in the Master Plan forces small boaters to travel farther from safe harbors. In a few cases (e.g. the mouth of San Francisco Bay), the Master Plan Team avoided areas that are important for harbor access and safety. We recommend that the Master Plan Team consider establishing substantial SMRs along remote stretches of productive coastline, such as near Del Mar SMR, Purisima SMR, and Concepcion SMP.

An important element that is missing from the MLPA management plan is the rationale for (1) not establishing MPAs elsewhere instead of the proposed areas and (2) establishing one type of MPA over another type at each locale. User groups are likely to attempt to move MPAs farther from ports and into less valuable (and often less diverse) areas (e.g. Big Sycamore Canyon and Vandenberg). In addition, user groups are likely to demand fewer restrictions in proposed MPAs. Some of the contentiousness may be alleviated or the discussion may be better focused by fully explaining why certain areas were proposed for the establishment of the various types of MPAs.

Sufficiency of monitoring, evaluation and enforcement: MLPA Master Plan

A plan to monitor, evaluate and enforce the MPA network has not yet been provided for the Master Plan. Monitoring and enforcement are the keys to a sustaining a viable MPA network, and the plan cannot be fully evaluated in the absence of this critical information.

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Summary: MLPA Master Plan

With respect to other primary goals of the MLPA, the proposed MPA network is likely to contribute substantially to the protection of sustainable ecosystems and the rebuilding of depleted populations of coastal species. The siting of many of the proposed MPAs also will contribute to the educational and research objectives of the Act. Many of the proposed MPAs are situated to allow for adequate evaluation of their effects if monitoring programs are designed effectively and implemented. Given our present state of knowledge of these coastal marine ecosystems and the design criteria necessary for creating effective MPA networks, the proposed network and recommendations provided herein are probably as well-designed as can be expected at this time.

General recommendations

- Additional area for SMRs should be established in the northern central and southern central regions, particularly in cases when small SMRs are not buffered by other MPA designations, or small SMRs are buffered only by SMCAs that do not restrict recreational take.
- Extending the offshore boundaries of small SMRs to the three-mile State boundary would increase the level of protection for continental shelf habitats (30-200 m), thus increasing effective protection of habitats and biodiversity mandated by the Act.
- Additional SMRs should be designated or additional protection should be added to proposed regulation for MPAs that are located in the largest gaps between MPAs proposed in the Master Plan.
- “Baitfish”, including anchovies, herring, and mackerel, should be protected within MPAs because of their documented importance as an energy source for benthic species.
- Benthic migratory species, such as halibut, crabs, and lingcod, should be protected within MPAs.

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SOUTHERN REGION

Robert Warner and Satie Airame

Proposed reserve network: southern region

The southern region extends from Point Conception in the north to the Mexican border to the south. In addition, Santa Catalina, San Clemente, and San Nicolas Islands are included within this region. The Northern Channel Islands, including Santa Barbara, Anacapa, Santa Cruz, San Miguel, and Santa Rosa Islands, are excluded from the Master Plan Team's network because a separate process within the Channel Islands National Marine Sanctuary has been established to develop a regional MPA network among those islands.

The Master Plan Team identified 23.01 MPA sites throughout the southern region.

• Conception SMP (1% in the southern region)	1.6 km ²
• Refugio SMP	3.7 km ²
• Naples SMCA	65.1 km ²
• Coal Oil Point SMR	27.2 km ²
• Carpinteria SMP	34.6 km ²
• Leo Carrillo SMR	83.6 km ²
• Santa Monica Bay SMCA	236.9 km ²
• Lunada Bay SMR	2.6 km ²
• Abalone Cove SMP	0.3 km ²
• Point Fermin SMR	0.6 km ²
• Crystal Cove SMR	15.5 km ²
• Laguna Intertidal SMCA	2.7 km ²
• Dana Point SMR	9.0 km ²
• Pendleton SMR	72.3 km ²
• La Jolla SMR	43.6 km ²
• Point Loma SMR	29.7 km ²
• West End SMR (Santa Catalina)	25.0 km ²
• Wrigley Institute of Environment SMR (Santa Catalina)	8.1 km ²
• East Side SMCA (Santa Catalina)	46.5 km ²
• Avalon Bay SMP (Santa Catalina)	14.9 km ²
• Farnsworth SMP (Santa Catalina)	4.3 km ²
• Castle Rock SMR (San Clemente)	44.0 km ²
• East San Clemente SMR	10.2 km ²
• China Point SMR (San Clemente)	76.6 km ²

In the southern region, the network of MPAs includes approximately 23.5% (or 858.8 km²) of the 3662.8 km² within state waters. Approximately 12.2% (or 448.1 km²) of the southern region is in state marine reserves (SMRs). Limited commercial and recreational fishing (within SMCAs) is allowed in 9.6% (or 351.3 km²) and limited recreational

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fishing is allowed within 1.6% (or 59.4 km²) of the area protected within the proposed network of MPAs in the southern region. Several of these areas (SMCAs, in particular) offer minimal protection for the species contained within them. Overall, the total area proposed to be set aside within the present plan is adequate, but should not be reduced. Thus any modifications to the plan should consist of relocating protected areas rather than simply eliminating them.

Table 1 summarizes key features of each proposed MPA site, including MPA type, size, depth range, habitat composition, and proposed regulations. The Master Planning Team's description of each MPA includes a brief summary of the general setting and environmental features for each site including proposed boundaries, proposed regulations, whether or not the area encompasses an existing MPA of some type, and any special ecological features.

Adequacy of protection: southern region

Overall, the proposed network for the southern region protects a wide variety of representative habitats, replicating that protection in more than one site, and providing MPAs large enough to contribute significant protection for biodiversity. Revisions to the plan should meet or exceed that standard. We note gaps in protection in the following discussion.

Conception SMP and Carpinteria SMP will allow recreational finfishing from shore. The opportunity for finfishing from shore means that benthic fishes that venture near the shore will be at risk of mortality. The realized protection for benthic fishes within the SMPs is beyond the casting distance from shore. Additional shallow offshore habitat should be added to the SMPs to compensate for the impacts of nearshore extraction.

Abalone Cove SMP and Avalon Bay SMP will allow recreational finfishing. Recreational hook-and-line fishing has the capability of significantly reducing the abundance and average size of many benthic species, and is incompatible with the MLPA goal of preserving intact ecosystems. These areas therefore are not likely to achieve the objectives of a marine reserve for this local area.

Farnsworth SMP will allow recreational fishing for pelagic species only, defined as yellowtail, tunas, mackerel, sardines, anchovy, and barracuda. The success of Farnsworth SMP as an effective MPA depends on the assumption that pelagic species are generally decoupled from the benthic ecosystem. While this assumption may be true for transient pelagics such as tuna, the other species function as local predators on benthic and pelagic species (e.g. yellowtail and barracuda), or as major prey items (e.g. sardines and anchovy), and are thus important members of the local food web.

Naples SMCA will permit recreational and commercial removal of lobsters, as well as recreational extraction of finfish. Lobsters and benthic fishes in this area are important predators, and their removal from the food web is incompatible with the preservation of an area characterized by a "rich diversity of benthic invertebrates, fish, and seaweeds".

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However, if the intent of this designation is to gauge the effect of limited consumptive use, then appropriate control areas must be designated.

Santa Monica SMCA and the East Side MCAs simply represent a redefinition of areas with no changes in current regulations. Both areas are open to extraction only in accordance with local regulations that were not detailed in the Planning Team's narrative. Given that removal of organisms embedded in the local marine community affects ecosystem structure, this designation does not contribute to the MLPA goal of protecting biodiversity. The East Side SMCA, which allows limited commercial and recreational extraction, offers an opportunity for comparison with the adjacent Wrigley Institute of the Environment Research Station SMR, a fully protected marine reserve.

The Laguna Intertidal SMCA will reduce the present level of protection (no-take) in segments of this area, opening the entire area to recreational and commercial extraction, except for intertidal marine organisms. Several important predators of intertidal organisms reside in shallow subtidal areas and allowing their mortality while preserving prey species is incompatible with the MLPA goal for ecosystem preservation.

MPA Size: southern region

Table 2 summarizes the number, the size, and percent representation of each MPA type in each region. There are 15 MPAs proposed for the southern coastal region (3 SMCA, 3 SMP, and 9 SMR), and 8 MPAs proposed for the southern Channel Islands (1 SMCA, 2 SMP, and 5 SMR). SMRs in the area range from 0.6 to 84 km², MCAs from 2.7 to 237 km², and SMPs from 0.3 to 35 km². Many proposed MPAs in the region are of adequate size to allow ecosystem protection and recovery. However, several protected areas may be too small to contribute effectively to conservation of marine habitats, ecological processes, and species of concern. Small marine protected areas in the southern region include:

• Refugio SMP	3.7 km ²
• Lunada Bay SMR	2.6 km ²
• Abalone Cove SMP	0.3 km ²
• Point Fermin SMR	0.6 km ²
• Laguna Intertidal SMCA	2.7 km ²
• Dana Point SMR	9.0 km ²
• Wrigley Institute of Environment SMR (Santa Catalina)	8.1 km ²
• Farnsworth SMP (Santa Catalina)	4.3 km ²
• East San Clemente SMR	10.2 km ²

While mortality for some or all species will be reduced in these areas, they are not of adequate size to contain the home ranges of more mobile species. Lack of full protection for mobile species will result in smaller overall populations and smaller average individual sizes, thus limiting the potential for larval export from small MPAs. Extending the offshore boundaries of these MPAs to the three-mile State boundary would

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increase the level of protection for habitats and biodiversity. With the exception of the four intertidal reserves, it is unclear why the offshore boundaries were limited for many of the MPAs, but not for others.

MPA spacing: southern region

Within the southern region, MPAs are about 10 km apart on average, which should be sufficient for network functionality. Additional MPAs should be designated in the largest gaps between MPAs proposed in the draft Master Plan. Large gaps between MPAs occur in the following locations:

- *Conception SMP – Refugio SMR* (32.7 km between MPAs)
This section of the Gaviota Coast has several areas of rocky reefs interspersed with sandy bottoms that would provide ideal locations for protected areas.
- *Coal Oil Point SMR – Carpinteria SMP* (26.7 km between MPAs)
There are several rocky headlands and reefs along this stretch of coastline, but onshore development is intensive.
- *Carpinteria SMP – Leo Carillo SMR* (62.8 km between MPAs)
This is the largest gap between MPAs in the network. Much of the coast in this area is sandy, with few rocky areas to provide suitable hard-bottom substrate. However, there are wetland/estuarine areas near Point Mugu that merit consideration for inclusion in the MPA network.
- *Point Fermin SMR – Crystal Cove SMR* (40.9 km between MPAs)
This is a highly impacted area, including the Port of Los Angeles, with little rocky habitat. However, there are extensive wetland/estuarine areas near Seal Beach and Huntington Beach that merit consideration for inclusion.
- *Pendleton SMR – La Jolla SMR* (37.2 km between MPAs)
This is mostly sandy habitat, but this stretch of coastline includes many of California's remaining estuaries and wetlands. Some of these areas should be included in the MPA network.

Habitat inclusion: southern region

Including all major marine habitats within MPAs ensures that a wide range of marine communities are protected, and also provides protection for those species whose life histories span several habitats. The Master Plan Team included diverse habitats in MPAs in the southern region. Fifteen of 21 proposed MPAs are situated along the open coast, 7 are located along the coast of the Channel Islands, and 1 is located offshore.

Depth. The proposed network of MPAs primarily protects habitats between the intertidal to the shallow continental shelf to 100 m. The area of habitat at different depth intervals protected in MPAs in the southern region is summarized in Tables 3-5. Approximately

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20.7% (or 304.1 km²) of the habitat from 0-30 m is protected by MPAs proposed in the Master Plan, with the majority of the area divided between SMRs (9.2%) and SMCAs (9.9%). Approximately 23.4% (or 373.7 km²) of the shallow continental shelf is protected in MPAs, with the majority of the area divided equally between SMRs and SMCAs. Approximately 505 km² of deep continental shelf habitat from 100-200 m is located within the southern region. Approximately 19.7% (or 99.8 km²) of the deep continental shelf is protected in MPAs and most of the protection (14.9% or 75.3 km²) is in no-take marine reserves (SMRs). Very little deep continental shelf is protected within SMPs (0.2% or 0.8 km²) and SMCAs (4.7% or 23.8 km²). Extending the offshore boundaries of some of the smaller MPAs to the three-mile State boundary would increase the level of protection for deep continental shelf habitats. With the exception of the four intertidal reserves, it is unclear why the offshore boundaries were limited for many of the MPAs, but not for others.

Preservation of key habitats. The specific descriptions of individual MPAs provided by the Master Plan Team indicate that a variety of habitats are represented in MPAs. Based on the depth distribution data provided by the California Department of Fish and Game, the major deficiency in the proposed network is in deeper habitats. Some of this is imposed by the three-mile State boundary, but the deficiency could be ameliorated by extending the borders of many MPAs to the full three-mile limit, as described above.

Although detailed habitat data are not available for most of California waters, historic kelp bed distributions indicate locations of important shallow water rocky habitats. Shallow rocky habitat was given high priority in the Master Plan Team's design criteria, and the current MPA proposal provides good protection for this priority habitat in the southern region (Table 6). Approximately 35.5% of historic kelp beds in State waters are protected within the MPA network in the southern region, with the majority of the habitat (25%) in fully protected marine reserves.

There are eight major submarine canyons off the coast of southern California and three (or 38%) are protected with the proposed MPA network (Table 7): La Jolla SMR, a portion of the canyon off Rodondo Beach in the Santa Monica Bay SMCA, and portion of the canyon off of Point Dume in the Leo Carillo SMR.

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Summary: southern region

The evaluation of the Master Plan for the southern region using the six major criteria reveals that it is well designed to meet goals for biodiversity conservation. However, slight adjustments are recommended to achieve the goals set by the MLPA.

- The area of shallow offshore habitat protected in MPAs should be increased slightly to compensate for the impacts of nearshore extraction in SMPs and SMCAs, particularly in Conception SMP, Naples SMCA, and Santa Monica Bay SMCA.
- Offshore boundaries of some of the nearshore MPAs (e.g. Crystal Cove SMR, Dana Point SMR, West End SMR, Avalon Bay SMP) should be extended to the three-mile State boundary to increase the level of protection for ecosystem biodiversity
- To increase the level of connectivity between proposed sites, additional MPAs should be added in areas where there are large gaps, particularly in the following regions:
 - Conception SMP to Refugio SMR
 - Coal Oil Point SMR to Carpinteria SMP
 - Carpinteria SMP to Leo Carillo SMR
 - Point Fermin SMR to Crystal Cove SMR
 - Pendleton SMR to La Jolla SMR
- Boundaries of MPAs should be squared off using latitude and longitude lines to facilitate enforcement of proposed regulations.

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SOUTHERN CENTRAL REGION

Mark Carr and Craig Syms

Proposed reserve network: southern central region

The Southern Central Region extends from Point Año Nuevo in the north to Point Conception in the south. In addition, San Nicholas Island is included within this region. The remaining Channel Islands in the southern central region, including San Miguel and Santa Rosa Islands, are excluded from the Master Plan Team's network because a separate process has been established for a regional MPA network among those islands.

The Master Plan Team identified 22.13 MPA sites throughout the southern central region. Table 1 summarizes key features of each proposed MPA site, including MPA type, size, depth range, habitat composition, and proposed regulations.

• Año Nuevo SMR (59% in the south central region)	14.7 km ²
• Año Nuevo SMCA (55% in the south central region)	23.9 km ²
• Natural Bridges SMCA	49.6 km ²
• Natural Bridges SMR	6.8 km ²
• Soquel Canyon SMCA	54.1 km ²
• Portuguese Ledge SMCA	24.1 km ²
• Hopkins SMR	0.9 km ²
• Pacific Grove SMCA	13.3 km ²
• Carmel Bay SMP	6.4 km ²
• Point Lobos SMCA	29.7 km ²
• Point Lobos SMR	2.8 km ²
• Point Sur SMCA	26.8 km ²
• Julia Pfeiffer Burns SMR	7.1 km ²
• Big Creek SMCA	24.0 km ²
• Big Creek SMR	6.4 km ²
• Salmon Creek SMR	9.7 km ²
• Piedras Blancas SMCA	28.8 km ²
• Cambria SMCA	45.0 km ²
• Cambria SMR	17.8 km ²
• Point Buchon SMCA	8.7 km ²
• Purisima Point SMCA	15.5 km ²
• Conception SMP (99% in the south central region)	188.5 km ²
• Area Charlie (San Nicolas Island) SMR	66.4 km ²

In the southern central region, the network of MPAs includes approximately 20.8% (or 670.7 km²) of the 3215.2 km² within State waters. Limited commercial and recreational fishing (within SMCAs) is allowed in 10.7% (or 343.3 km²) and limited recreational

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fishing is allowed within 6.1% (or 194.9 km²) of the area protected within the proposed network of MPAs in the southern region. Several of these areas (SMCAs, in particular) offer minimal protection for the species contained within them. Only 4.1% (or 132.5 km²) of the protected areas are in state marine reserves (SMRs).

The Conception SMP contributes markedly (27.3%) to the overall area allocated to MPA designation in the southern central region. Because of its location, restricted use of Conception SMP is likely to have the least impact on recreational and commercial activities. However, it should be noted that this large area contributes disproportionately to the overall proposed allocation to MPAs, possibly at the cost of more representation of areas to the north, which may be currently subject to higher levels of human impact.

Overall, the proposed MPAs in the southern central region appear to be carefully considered and supported by available data. Although the information necessary for making these determinations was limited, it is clear that the Master Plan members considered all the information available to them. Most suggested changes to the proposed designations and siting of MPAs reflect small increases in some of the small SMRs surrounded by SMCAs with limited restrictions.

In a related process, CDFG is developing the state's first fishery management plan for nearshore finfish. Marine reserves and other MPAs have the potential to assist in meeting the objectives of that process. To highlight those possibilities, we include relevant information on these species:

Table 12 summarizes the habitat requirements and distributions of the 19 fish species targeted by the Nearshore Fishery Management Plan and the percent of their habitat contained within the proposed MPAs.

Table 13 indicates which of the 19 MLMA nearshore fishery species occurs within each proposed MPA site and whether or not that species is presently fished from the block that overlaps with the MPA.

Adequacy of protection: southern central region

Two SMP sites are proposed within this region, Carmel Bay and Conception. Carmel Bay SMP allows the recreational take of finfish only. As proposed, finfish are protected from commercial fishing throughout most of Carmel Bay and from recreational fishing only in the Point Lobos SMR. Conception SMP allows only recreational finfishing by hook and line from shore. The opportunity for finfishing from shore means that benthic fishes that venture near the shore will be at risk of mortality. The realized protection for benthic fishes within the SMPs is beyond the casting distance from shore. Additional shallow offshore habitat should be added to the SMPs to compensate for the impacts of nearshore extraction.

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Of the 12 areas proposed as SMCAs, 9 allow fishing for specific transitory pelagic species only (albacore, salmon, sardine, herring, mackerel, anchovies). Following the arguments in the previous discussion on pelagic species (MLPA Master Plan: Adequacy of Protection), only managed fishing for albacore and salmon should be permitted in protected areas.

Commercial take of squid and kelp are exempt from the Pacific Grove SMCA restrictions and spot prawns are exempt from the Point Lobos SMCA restrictions.

Three large SMCAs (Natural Bridges, Pacific Grove and Cambria) allow recreational fishing. As such, a significant proportion (30%) of the areas designated as SMCA does not provide finfish protection from recreational fishing. We recommend extending the northwestern boundary of Natural Bridges SMCA 1.6 km to the northwest, contiguous with the northern boundary of our proposed extension of the inshore Natural Bridges SMR (see following section), in order to compensate for the impacts of recreational fishing.

MPA size: southern central region

There are 23 MPAs proposed along the coast of the southern central region (12 SMCA, 2 SMP, and 8 SMR), and one SMR proposed for San Nicholas Island. Two of these MPAs, Año Nuevo SMCA and Conception SMP, overlap adjacent regions to the north and south. SMRs in the southern central region range from 1 to 66 km², SMCAs from 9 to 54 km², and SMPs from 6 to 190 km² (Table 2).

Although the minimum area sufficient to sustain self-replenishing populations varies among species, some of the proposed SMRs are probably not large enough to be buffered from fishing in surrounding areas, particularly small, isolated SMRs and small SMRs that are surrounded by SMCAs that allow limited commercial and recreational fishing. For conservation purposes, larger reserves protect greater biodiversity. We recommend increasing the size of a few small SMRs buffered only by SMCAs that do not restrict recreational take. Increasing the size of these areas will also increase the overall proportion of area set aside in the fully protected SMR category, only 4.1% of the southern central region. Of particular concern are the following SMRs:

- Natural Bridges SMR 6.8 km²
- Hopkins SMR 0.9 km²
- Julia Pfeiffer Burns SMR 7.1 km²
- Salmon Creek SMR 9.6 km²
- Point Buchon SMR 8.7 km²

Although Cambria SMR is substantial (17.8 km²), the length of this reserve is short (3.3 km) and the adjacent SMCA allows recreational fishing, reducing the likelihood that populations will be protected sufficiently in Cambria SMR. Specific recommendations for each of these MPAs are provided.

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Natural Bridges SMR. The 3.6 km length of this reserve is probably too short to guarantee that movement of fish does not jeopardize their vulnerability to recreational fishing. Because of the small area of this SMR and the allowance of recreational fishing in the adjacent SMCA, this SMR should be lengthened to the north approximately 4.8 km to Sand Hill Bluff, a recognizable coastal landmark. This extension would incorporate more of the northern boundary of giant kelp forests and create an overall SMR length of 8.5 km.

Hopkins SMR. Further extension offshore to a depth of 30 m (rather than 20 m) would incorporate more deep rocky reef habitat.

Julia Pfeiffer Burns SMR. Extending the length of this reserve along the coast may be warranted. However, the southern boundary is in close proximity to the Big Creek reserves and the northern boundary is defined by Partington Point, a well-known coastal feature. This small increase in length may increase protection for mobile species (especially finfishes) and increase self-replenishment of sessile invertebrates (e.g. abalone) within this reserve.

Salmon Creek SMR. Because of the small area of this reserve and the short distance it extends offshore (1 mile), further extension from shore by 1 mile (to the 80 m isobath) may be necessary to achieve goals for biodiversity protection.

Cambria SMR. Extending this SMR northward 2 km to a clearly identified coastal feature at the cost of the adjacent SMCA would be consistent with restrictions along other portions of this region.

Point Buchon SMCA. This is one of the smaller and shorter MPAs. The location of the southern boundary of the proposed SMCA off Diablo Canyon was designed to take advantage of the northern monitoring sites for Diablo Canyon. The proposed northern boundary of this MPA falls south of Point Buchon. Extending the northern boundary of this SMCA 2 km northward (extending just around the Point) incorporates all of the Point as well as the kelp stand that extends north of and is contiguous with the stand within the proposed boundaries.

MPA spacing: southern central region

Within the southern central region, spacing must consider the distinctions made between SMCAs that allow recreational fishing from those that do not.

The sizes of adjacent MPAs will impact the effective distance between them. Smaller reserves are likely to be more dependent on replenishment from adjacent reserves. Distances between adjacent non-contiguous MPAs are about 15 km apart on average, which should be sufficient for network functionality. The largest gap in protection (108.3 km) is between Cambria SMR and Conception SMP in the southern central region. Distances between adjacent fully protected marine reserves (SMRs) are about 36.7 km apart on average, which may limit connectivity among reserve sites. In addition, some

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SMRs are probably too small to protect many nearshore fish species. For example, Natural Bridges SMR, Point Lobos SMR, Julia Pfeiffer Burns SMR, and Big Creek SMR and Salmon Creek SMR are all less than 10 km², leaving large gaps in protection along the southern central coast from Natural Bridges to Conception. The largest gaps include the following sites.

- Natural Bridges SMR to Point Lobos SMR 37.7 km
- Point Lobos SMR to Julia Pfeiffer Burns SMR 45.8 km
- Big Creek SMR to Salmon Creek SMR 30.6 km
- Salmon Creek SMR to Cambria SMR 36.7 km
- Cambria SMR to Conception SMP 108.3 km

Additional SMRs should be designated or additional protection should be added to proposed regulations for MPAs that are located in the largest gaps between MPAs proposed in the Master Plan.

Habitat inclusion: southern central region

Depth. The proposed network of MPAs primarily protects habitats between the intertidal to the shallow continental shelf to 100 m (Table 3-5). Approximately 13.6% (or 173 km²) of the habitat from 0-30 m is protected by MPAs proposed in the Master Plan, with the majority of the area divided between SMPs (5%) and SMCAs (6.2%). Approximately 17.2% (or 334.1 km²) of the shallow continental shelf (30-100 m) is protected in MPAs, with the majority of the area divided between SMPs (6.3%) and SMCAs (8.3%). Approximately 300 km² of deep continental shelf habitat from 100-200 m is located within the southern central region. Approximately 17.8% (or 53.3 km²) of the deep continental shelf in the southern central region is protected in MPAs, but only 3.2% (or 9.6 km²) is protected within no-take marine reserves (SMRs). Extending the offshore boundaries of some of the smaller SMRs to the three-mile State boundary would increase the level of protection for deep continental shelf habitats.

Preservation of key habitats. Although detailed habitat data are not available for most of California waters, CDFG provided maps of historic kelp bed distributions. Giant kelp is well-represented (28%) in proposed the MPA network the southern central region (Table 6). Approximately 13% and 10% of the historical kelp beds in are protected in marine reserves (SMRs) and SMCAs, respectively. An additional 5% of the historic kelp beds are protected in SMPs. Because some of the proposed SMPs and SMCAs allow for recreational fishing of the species targeted for regulation in the NFMP, the overall percentage of this critical habitat excluded from all fishing impact is only 19.3%. Increasing the sizes of some of the smallest SMRs would contribute to conservation and protection of kelp beds and the diverse associated assemblage of nearshore fishes, invertebrates and marine mammals.

The two most notable geologic features in the southern central region are the two large estuarine systems (Elkhorn Slough and Morro Bay) and the submarine canyons (Monterey Canyon and Carmel Canyon) (Table 7).

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Although the two estuarine systems in this region have existing regulatory designations, incorporating them into the MPA designation would emphasize their ecological importance and clarify their regulatory status along with the open coast areas. Elkhorn Slough should be identified on the map as an SMCA (according to its proposed re-designation) to emphasize its ecological significance. Moreover, it is not clear why Morro Bay estuary does not receive the same SMCA designation, even though it has some existing regulatory designation. For the process of standardizing designations (a very important contribution of the MLPA process), it seems appropriate to re-designate Morro Bay as one of the three MPA designations. Like Elkhorn Slough, it should be identified and emphasized on the map. Further consideration should be given to restricting the recreational take of elasmobranch species that aggregate within and utilize these areas for reproductive purposes.

Portions of the Monterey and Carmel submarine canyons are within the proposed Soquel Canyon SMCA, Carmel Bay SMP and Point Lobos SMCA.

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Summary: southern central region

Overall, the proposed network of MPAs for the southern central region is well designed with respect to habitat representation, spacing, individual size and regulations. Adjustments are recommended to achieve the goals set by the MLPA. Our recommendations include three general issues: (1) the size of SMRs adjacent to those SMCAs that do not restrict recreational fishing, (2) the species of pelagic finfish identified for exemption from restrictions in SMCAs, and (3) official documentation and nomenclature for the few estuarine systems within the region.

- The sizes of a few small SMRs, including Natural Bridges, Hopkins, Julia Pfeiffer Burns, Salmon Creek and Point Buchon, should be increased to meet the MLPA goals for conservation of ecosystem biodiversity.
- Exclusions from protection of pelagic species (in SMCAs and SMPs) should be limited *strictly* to salmon and albacore.
- No exemptions from protection should be made (in SMCAs and SMPs) for (1) any benthic migratory species such as halibut, crabs and lingcod and (2) any highly mobile species that are integrated into local food webs, such as anchovy, herring, and mackerel.
- Elkhorn Slough and Morro Bay should be designated as SMCAs (according to their existing regulatory designation).
- Elasmobranch species that aggregate within and utilize estuarine areas for reproductive purposes should be protected from recreational fishing.
- To increase the level of connectivity between proposed sites, additional MPAs should be added in areas where there are large gaps, particularly in the following regions:
 - Natural Bridges SMR to Point Lobos SMR
 - Point Lobos SMR to Julia Pfeiffer Burns SMR
 - Big Creek SMR to Salmon Creek SMR
 - Salmon Creek SMR to Cambria SMR
 - Cambria SMR to Conception SMP

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NORTHERN CENTRAL REGION

Steve Morgan

The Master Plan for the north central region is thorough and well conceived. It carefully balances numerous variables, and proposes a network of MPAs that represent a thoughtful compromise. All criteria for the establishment of a network of MPAs have been considered, resulting in a sound proposal. The aim of this evaluation is to provide a quantitative assessment of the proposal by analyzing data that was not entirely available to the Master Plan Team. This analysis shows that small adjustments are necessary to achieve MLPA goals for the north central region. Based on the six evaluation criteria, the network of proposed MPAs along the north central coast of California is least likely of the four regions to maintain biodiversity and the integrity of the marine ecosystem.

Proposed reserve network: northern central region

The north central region extends from Point Arena in the north to Año Nuevo in the south and includes the Farallon Islands. Much of the coastline is remote, and habitats are diverse. It is characterized by prevailing northwest winds and frequent winter storms. The Master Plan Team proposed 15.33 MPA sites in this region.

• Point Arena SMR (47% in north central region)	8.3 km ²
• Del Mar Point SMR	0.3 km ²
• Salt Point SMR	0.2 km ²
• Salt Point SMP	7.1 km ²
• Fort Ross SMR	1.0 km ²
• Sonoma Coast SMCA	36.3 km ²
• Bodega SMR	5.9 km ²
• Estero Americano SMR	1.4 km ²
• Estero de San Antonio SMR	1.2 km ²
• Bird Rock SMR	3.8 km ²
• Point Reyes Headlands SMR	15.5 km ²
• Duxbury Reef SMCA	17.3 km ²
• Farallon Islands SMR	17.9 km ²
• Farallon Islands SMCA	98.5 km ²
• James V. Fitzgerald SMR	14.7 km ²
• Año Nuevo SMR (41% in north central region)	10.3 km ²
• Año Nuevo SMCA (45% in north central region)	19.5 km ²

The total amount of habitat proposed for protection in MPAs within the north central region (260 km² or 13.6% of 1908 km² in the north central region) is the least of the four regions and falls below the minimum recommended level. Therefore, a modest increase in the total area to be set aside for MPAs is recommended. Table 1 summarizes key features of each proposed MPA site, including MPA type, dimensions, depth range, habitat composition, and proposed regulations. The Master Plan Team's description of

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each MPA includes a brief summary of the general setting and environmental features for each site including proposed boundaries, proposed regulations, whether or not the area encompasses an existing MPA of some type, and any special ecological features.

Adequacy of protection: northern central region

The Master Plan closes only 4.2% (80.4 km²) of State waters in the northern central region to fishing of any kind (SMR) (Table 2). A mere 0.4% (7.1 km²) is closed to commercial fishing while allowing some recreational fishing (SMP). Therefore, only 4.4% (87.5 km²) of State waters in the northern central region is off-limits to commercial fishing.

Only one SMP has been proposed for the northern central region (Salt Point). Here, recreational fishing for squid and benthic invertebrates, including abalone, chitons, clams, cockles, crabs, ghost shrimp, sea urchins and sea cucumbers, is allowed. The effects of this recreational fishing may be determined by contrasting these populations with those occurring in the adjacent, tiny SMR (0.2 km²) at Salt Point SMR. However, the removal of so many large, dominant members of the benthic community likely will have a major impact on ecosystem structure and is incompatible with the goal of preserving whole, intact ecosystems.

Recreational fishing is permitted in 73% of the MPA network in the northern central region. Furthermore, most of the network (9% or 171.6 km² of State waters) is comprised of SMCAs that allow both commercial and recreational fishing.

Four SMCAs have been proposed for the northern central region. All of them allow commercial and recreational fishing for salmon only. These SMCAs will afford considerable protection for the ecosystem by restricting fishing to a pelagic migratory species with one caveat. Only trolling should be permitted in the SMCAs, because considerable by-catch of benthic fishes could result if mooching were permitted. Furthermore, enforcement would be easier if fishing for salmon were restricted to trolling, because all boats with lines in the water would have to be underway to be legal. Therefore, law enforcement could tell at a distance whether boats present in the area are complying with regulations. The proposed SWCAs likely will afford greater protection to ecosystems and biodiversity than will the SMP.

MPA size: northern central region

Many proposed MPAs in the region are of adequate size to allow some ecosystem recovery and export, but many of the most restrictive types of MPAs are not. The proposed SMRs are particularly small, ranging from 0.2 to 17.9 km² and averaging 8.9 km². Most of the SMRs (6/9) and the SMP are unlikely to be of adequate size to contain the home ranges of mobile adults, and fewer larvae will be produced to seed areas outside of these reserves.

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Small marine reserves in the northern central region:

• Point Arena SMR	8.3 km ²
• Del Mar Point SMR	0.3 km ²
• Salt Point SMR	0.2 km ²
• Salt Point SMP	7.1 km ²
• Fort Ross SMR	1.0 km ²
• Bodega SMR	5.9 km ²
• Bird Rock SMR	3.8 km ²

In contrast, the four SMCAs range from 17.3 to 98.5 km² and average 42.9 km². The SMCAs provide the least protection for habitats and species because they allow continued commercial and recreational extraction. Fully protected marine reserves (SMRs) offer the most protection for marine habitats and species of concern of the three MPA designations. Setting aside more area for SMRs and SMPs should be considered to achieve MLPA goals for biodiversity conservation in the northern central region.

The Estero Americano and Estero de San Antonio also are small but only because the sizes of the esteros are small.

MPA spacing: northern central region

MPAs in the north central region are spaced about 15 km apart on average, which generally should be sufficient for network connectivity. However, not all MPAs provide sufficient protection for habitats and species of concern. Two designations, SMCAs and SMPs allow commercial and/or recreational fishing, limiting the potential benefits of these designations for conservation and fisheries. Distances between adjacent fully protected marine reserves (SMRs) in the northern central region are about 25.4 km on average. In addition, some SMRs are probably too small to protect many nearshore fish species. For example, Del Mar Point SMR, Salt Point SMR, Fort Ross SMR, Bodega SMR, and Bird Rock SMR are all less than 6 km², leaving large gaps in protection along the northern central coast.

Fitzgerald SMR area. The Fitzgerald SMR is the most isolated MPA in the north central network. The Fitzgerald SMRs nearest MPAs to the south are at Año Nuevo, which is located 37.3 km to the south. The closest neighbors to the north are about 38 km away at Duxbury along the coast and at the Farallon Islands SMR offshore. The long stretch of coastline between Año Nuevo and San Francisco Bay is characterized by alternate rocky and sandy areas. Several state parks are dotted along this coastline and serious consideration should be given to locating an MPA at one of them. The area between Fitzgerald SMR and Año Nuevo should receive the strongest consideration, because it is less populated, farther from a major port and less likely to be polluted than the area between Fitzgerald SMR and San Francisco Bay.

Point Arena to Salt Point. The distance between Point Arena SMR and the Salt Point SMR and SMCA pair is 49.5 km, except for the tiny (0.2 km²) Del Mar SMR that is located midway between them. The Del Mar SMR is much too small to substantially

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increase the connectivity between the Point Arena and Salt Point MPAs. Therefore, this long section of shoreline likely is even more unprotected than the area around the Fitzgerald SMR. The area between Point Arena and Salt Point is rocky and kelp abounds. It also is removed from ports and launch sites for small boats. Finally, the Sea Ranch community is located in this otherwise sparsely inhabited area, and residents may be enlisted to help watch over the MPA. This area is an ideal location to establish a large MPA, and it is recommended that the Del Mar MPA be expanded considerably to the south and to the three-mile limit.

Other areas north of Point Reyes. Small SMRs punctuate the coast to the north of Point Reyes, and connectivity between MPAs could be enhanced by establishing larger MPAs. Between Salt Point and Point Reyes, two large portions of this shoreline are connected only by the occurrence of one small SMR. The distance between Salt Point SMP and Sonoma Coast Beach SMCA is 24.9 km and is protected only by the Fort Ross SMR, which is only 0.99 km². Similarly, the distance between Bodega SMR and Point Reyes is 25.5 km and is protected only by the Bird Rock SMR, which is 3.7 km². Rocky and sandy areas alternate between Salt Point and Sonoma Coast State Beach, whereas most of the area between Bodega Bay and Point Reyes is sand, particularly south of Bird Rock. Establishing larger MPAs in these two areas would improve connectivity, but it is not as important as establishing MPAs between the longer stretches of shoreline between Point Arena and Salt Point and between Año Nuevo and San Francisco Bay.

Habitat inclusion: northern central region

The Master Plan Team ensured that diverse habitats were included in the proposed MPA network. Fifteen of the 17 MPAs in the north central region are situated along the open coast (3 SMCA, 3 SMP, and 9 SMR), two of them are located offshore at the Farallon Islands (1 SMCA and 1 SMR) and two SMRs are placed in small estuaries. However, the plan could be improved, primarily by including more deep-water habitats and kelp beds in the network.

Depth. The proposed network of MPAs primarily protects nearshore habitats that are one mile or less from the shore (Tables 3-5). Approximately 12.8% (or 100 km²) of the habitat from 0-30 m is protected by MPAs proposed in the Master Plan, and 7.8% (or 60 km²) is fully protected in marine reserves (SMRs). Approximately 16.1% (or 178.6 km²) of the shallow continental shelf are protected in MPAs proposed in the Master Plan, and the vast majority of the area (151.8 km² or 13.7%) is open to limited commercial and recreational take (SMCAs). Only 2% (or 21.9 km²) of the shallow continental shelf is protected in marine reserves. Only three of the MPAs include habitat between 1 to 3 miles from shore, and only two of the three include habitat deeper than 100 m, thereby leaving most deep-water habitats relatively vulnerable. The amount of deep continental habitat in state waters (0-3 miles) is significantly less in the northern central region (11.2 km²) than in other regions of California (129.3-505.5 km²). Approximately 6.6 km² of deep continental shelf habitat is protected in MPAs within the northern central region and all of the protected areas are open to limited commercial and recreational fishing (SMCAs): Sonoma Coast State Beach and the Farallon Islands. The proposed network

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does not include no-take marine reserves (SMR) that protect the deep continental shelf in the northern central region. No justification is provided for limiting protection in SMRs in the northern central region to less than 100 m. Protection for deep-water habitat and species could be increased by expanding more reserves to the three-mile limit. This expansion would contribute to sustaining biodiversity and the protecting the integrity of the ecosystem.

Preservation of key habitats. Although detailed habitat data are not available for most of California waters, historic kelp bed distributions indicate that important shallow-water rocky habitat is not sufficiently represented in the MPA network. Approximately 12% of the historical kelp beds in the north central section are protected in the proposed MPA network, and the majority of the kelp habitat is contained within fully protected marine reserves (SMRs) (Table 6). Kelp forests are highly productive and provide excellent habitat for many ecologically, commercially and recreationally important species of invertebrates and fishes. An effort should be made to double the amount of kelp included in the MPA network. Ninety-nine percent of kelp in the north central region occurs less than 20 meters deep necessitating the inclusion of more shallow water habitat in the network.

The proposed network includes critical biodiversity hotspots in the north central region. The most important of these special areas to be protected is the Farallon Islands, one of the richest areas of biodiversity along the California coast. These islands are occupied by a dense and diverse assemblage of seabirds and pinnipeds and are frequented by whales, other marine mammals and white sharks. This productive area supports many resident fishes and invertebrates as well as migratory species. No justification is provided for the lack of protection of the northern Farallon Islands. Some of the fishing pressure may shift to the northern Farallon Islands once the larger southern island group is protected.

Other notable biodiversity hotspots include Point Reyes and Año Nuevo, which also are colonized by pinnipeds and seabirds and are frequented by white sharks. Bird Rock provides important habitat for seabirds, and the pinnacles off Sonoma Coast State Beach appear to be valuable nursery habitat for rockfishes.

Two esteros have been included in the MPA network. These esteros are worthy of protection because they are both typical and peculiar to the western coast of the USA, even though they are not especially diverse and are presently impacted by agriculture and ranching.

MPAs were not established in San Francisco Bay. The San Francisco Bay is largest estuary on the western coast, providing habitat for a different set of species than occurs along the open coast. It also serves as a nursery area for many marine species. Although the estuary suffers greater assaults from pollution and invasive species, the inclusion of San Francisco Bay in the network may merit further consideration. Including all major types of habitats within MPAs would ensure that protection is provided for a wide range of marine communities and for species that live in both estuarine and open coast habitats at some point during their life cycle.

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Summary: northern central region

The evaluation of the draft Master Plan for the northern central region using the six major criteria reveals that it is ecologically sound and well conceived. However, adjustments are recommended to increase its effectiveness.

- The area in fully protected marine reserves (SMRs) should be increased to meet MLPA goals for conservation of ecosystem biodiversity in the northern central region.
- The area of deep continental shelf habitat (100-200 m) and kelp habitat in the MPA network should be increased to meet goals for habitat representation in the northern central region (e.g. expanding Del Mar SMR to the south and offshore).
- Offshore boundaries of some of the nearshore MPAs, particularly SMRs, should be extended to the three-mile State boundary to increase the level of protection for ecosystem biodiversity.
- To increase the level of connectivity between proposed sites, additional MPAs should be added in areas where there are large gaps, particularly in the following regions:
 - Point Arena SMR and Salt Point SMR/SMP
 - Salt Point SMR/SMP to Sonoma Coast Beach SMCA
 - Duxbury Reef SMCA to Fitzgerald SMR
 - Fitzgerald SMR to Año Nuevo SMR/SMCA
- Additional MPAs should be established away from promontories or proposed MPAs should be extended into the lee of headlands.
- Salmon fishing should be limited to trolling in SMCAs.
- Boundaries of MPAs should be squared off using latitude and longitude lines to facilitate enforcement of proposed regulations.

NORTHERN REGION

Proposed reserve network: northern region

The northern region extends from the Oregon border in the north to Point Arena in the south. In addition, Reading Rock and Saint George Reef are included within this region.

The Master Plan Team identified 18.53 MPA sites throughout the northern region.

• Saint George Reef SMR	30.9 km ²
• Castle Rock SMCA	31.7 km ²
• Reading Rock SMP	3.6 km ²
• Trinidad SMCA	50.3 km ²
• Patricks Point SMR	10.2 km ²
• Humboldt and Arcata Bays SMCA	66.8 km ²
• Eel SMR	33.5 km ²
• Kings Range SMR	52.8 km ²
• Lost Coast SMR	48.5 km ²
• Shelter Cove SMCA	42.4 km ²
• Sinkyone SMP	8.3 km ²
• De Haven SMP	9.0 km ²
• Mac Kerricher SMR	1.8 km ²
• Point Cabrillo SMR	22.3 km ²
• Russian Gulch SMP	0.6 km ²
• Mendocino SMCA	27.9 km ²
• Van Damme SMP	0.4 km ²
• Greenwood SMP	2.6 km ²
• Point Arena SMR (53% in northern region)	9.0 km ²

The network of MPAs in the northern region includes approximately 19% (or 472.6 km²) of the 2430.1 km² within State waters. Approximately 8.6% (or 209 km²) of the protected areas are in state marine reserves (SMRs). Limited commercial and recreational fishing (within SMCAs) is allowed in 9% (or 219 km²) and limited recreational fishing is allowed within 1.4% (or 34.4 km²) of the area protected within the proposed network of MPAs in the southern region. Several of these areas (SMCAs, in particular) offer minimal protection for the species contained within them.

Table 1 summarizes key features of each proposed MPA site, including MPA type, size, depth range, habitat composition, and proposed regulations. The Master Planning Team's description of each MPA (www.dfg.ca.gov/mrd/mlpa/) includes a brief summary of the general setting and environmental features for each site including proposed

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boundaries, proposed regulations, whether or not the area encompasses an existing MPA of some type, and any special ecological features.

Adequacy of protection: northern region

While mortality for some or all species will be reduced in these areas, they are not of adequate size to contain the home ranges of more mobile species. Lack of full protection for mobile species will result in smaller overall populations and smaller average individual sizes, thus limiting the potential for larval export from small MPAs. Some of the proposed protected areas are probably not large enough to be buffered from fishing in surrounding areas, particularly small SMRs that are surrounded by protected areas that allow limited commercial and recreational fishing (e.g. Patricks Point SMR) or small, isolated protected areas (e.g. Mac Kerricher SMR). Extending the offshore boundaries of some of these MPAs (e.g. Mac Kerricher SMR) to the three-mile State boundary would increase the level of protection for habitats and biodiversity.

Although proposed regulations restrict commercial fishing in Sinkyone and De Haven SMPs, these areas are too small to protect many nearshore fish species, leaving a gap in biodiversity protection from the Lost Coast to Point Cabrillo.

Although proposed regulations restrict commercial fishing in Russian Gulch, Van Damme, and Greenwood SMPs, these areas are too small to protect many nearshore fish species, leaving a gap in biodiversity protection from Point Cabrillo to Point Arena.

MPA Size: northern region

There are 19 MPAs proposed for the northern region (5 SMCA, 6 SMP, and 8 SMR). SMRs in the area range from 1.8 to 53 km², SMCAs from 28 to 69 km², and SMPs from 0.4 to 13.6 km². Many proposed MPAs in the region are of adequate size to allow ecosystem protection and recovery, with the following exceptions:

• Reading Rock SMP	3.6 km ²
• Sinkyone SMP	8.3 km ²
• De Haven SMP	9.0 km ²
• Mac Kerricher SMR	1.8 km ²
• Russian Gulch SMP	0.6 km ²
• Van Damme SMP	0.4 km ²
• Greenwood SMP	2.6 km ²
• Point Arena SMR	9.0 km ²

MPA spacing: northern region

Within the northern region, MPAs are about 12 km apart on average, which should be sufficient for network functionality. However, some of the MPAs (particularly SMCAs and SMPs) do not afford sufficient protection to all species of concern. Consequently,

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distances between fully protected marine reserves (SMRs) may greatly exceed the average distance between proposed MPAs. In the northern region, the average distance between fully protected marine reserves is 42 km. Large gaps between SMRs occur in the following locations.

- Saint George Reef SMR to Patricks Point SMR
- Patricks Point SMR to Eel SMR
- Eel SMR to Kings Range SMR
- Lost Coast SMR to Mac Kerricher SMR
- Point Cabrillo SMR to Point Arena SMR

Proposed regulations restrict commercial fishing in Sinkyone and De Haven SMPs, but these areas are probably too small to protect many nearshore fish species, leaving a gap in biodiversity protection from the Lost Coast to Point Cabrillo. Proposed regulations also restrict commercial fishing in Russian Gulch, Van Damme, and Greenwood SMPs, but these areas may not be large enough to protect many nearshore fish species, leaving a gap in biodiversity protection from Point Cabrillo to Point Arena. Additional SMRs should be designated in the largest gaps between MPAs proposed in the Master Plan.

Habitat inclusion: northern region

The Master Plan Team included diverse habitats in MPAs in the northern region. Seventeen of 19 proposed MPAs are situated along the open coast and 2 are located offshore.

Depth. The proposed network of MPAs primarily protects habitats between the intertidal to the shallow continental shelf to 100 m (Tables 3-5). Approximately 21.7% (or 257.7 km²) of the habitat from 0-30 m is protected by MPAs proposed in the Master Plan, with the majority of the area divided between SMCAs (12.9%) and SMRs (7.3%). Approximately 14.8% (or 162.6 km²) of the shallow continental shelf is protected in MPAs, with the majority of the area divided between SMRs (9.3%) and SMCAs (4.3%). Approximately 129 km² of deep continental shelf habitat from 100-200 m is located within the northern region. Approximately 26% (or 33.6 km²) of the deep continental shelf is protected in MPAs and over half of the protection (15% or 19.4 km²) is within no-take marine reserves (SMRs). There are no SMPs in deep waters (100-200 m).

Preservation of key habitats. The specific descriptions of individual MPAs provided by the Planning Team indicate that there are many different types of marine habitats included in most areas. Based on the depth distribution data provided by the CDFG, the major deficiency in the overall network is in deeper habitats. Some of this is imposed by the three-mile State boundary, but the deficiency could be ameliorated by extending the borders of many MPAs to the full three-mile limit, as described above.

Although detailed habitat data are not available for most of California waters, historic kelp bed distributions indicate locations of important shallow water rocky habitats. Shallow rocky habitat was given high priority in the Master Plan Team's design criteria,

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and the current MPA proposal provides good protection for this priority habitat in the northern region (Table 6). Approximately 2.9 km² of historic kelp beds in State waters are protected within the MPA network in the northern region, with the majority of the habitat in SMCAs.

There are four major submarine canyons off the coast of northern California and two of them are protected with the proposed MPA network (Table 7): Kings Range SMR and Lost Coast SMR.

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Summary: northern region

The evaluation of the Master Plan for the northern region using the six major criteria reveals that it provides some potential benefits for biodiversity and fisheries. However, slight adjustments have been recommended to achieve the goals set by the MLPA.

- To increase the level of connectivity between proposed sites, additional MPAs should be added in areas where there are large gaps, particularly in the following regions
 - Saint George Reef SMR to Patricks Point SMR
 - Patricks Point SMR to Eel SMR
 - Eel SMR to Kings Range SMR
 - Lost Coast SMR to Mac Kerricher SMR
 - Point Cabrillo SMR to Point Arena SMR
- To achieve MLPA goals for conservation of ecosystem biodiversity, the level of protection in and size of MPAs should be increased in the following regions: Lost Coast to Point Cabrillo, and Point Cabrillo to Point Arena.

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TABLES

Table 1. MPA designation, size, depth and habitat characteristics of each of the proposed MPAs in the draft Marine Protected Area Network for California state waters.

Table 2. Summary of the number, the size, and percent representation of each MPA type in each region designated for consideration under the Marine Life Protection Act.

Table 3. Amount of area (km²) and percent of total area in state waters of habitat from 0-30 m protected in MPAs.

Table 4. Amount of area (km²) and percent of total area in state waters of shallow continental shelf habitat (30-100 m) protected in MPAs.

Table 5. Amount of area (km²) and percent of total area in state waters of deep continental shelf habitat (100-200 m) protected in MPAs.

Table 6. Amount of area (km²) and percent of total area in state waters of giant kelp protected in MPAs. (Data imaging technique leads to underestimate of actual area.)

Table 7. Number of major submarine canyons protected in MPAs and percent of total in state waters.

Table 8. Distributions, depth ranges, and preferred habitats of selected marine invertebrates and fishes along the western coast of North America.

Table 9. The number of marine invertebrates and vertebrates (listed in Table 8) contained within each of the proposed marine protected areas in the Master Plan.

Table 10. The number of proposed marine protected areas in each region along the California coast that are likely to contain (or did contain in the past) selected marine invertebrates.

Table 11. The number of proposed marine protected areas in each region along the California coast that are likely to contain (or did contain in the past) the selected fishes.

Table 12. Habitat requirements and distributions of the 19 nearshore fishery species targeted by the Nearshore Fishery Management Plan and the percent of their habitat contained within the proposed MPAs.

Table 13. List of nearshore fishery species identified in the Marine Life Management Act that are present and commercially or recreationally fished within each proposed MPA sites.

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Table 1a. MPA designation, size, depth and habitat characteristics of each of the proposed MPAs within the northern region.

	Site	MPA Type	Total Size (km ²)	Shore Length (km)	Depth Range (m)	Habitats	Regulations
1	Saint George Reef	SMR	30.88		18-97	Varied and complicated bottom topography with numerous exposed rocks, wash rocks and breaking rocks.	No commercial or recreational fishing permitted.
2	Castle Rock	SMCA	32.36	21.08	0-29	High and low relief rocky bottom and numerous exposed wash rocks.	Recreational fishing is permitted. Commercial fishing permitted for salmon, albacore, market crab, sea urchin and coastal pelagic species (sardine, anchovy, herring, squid, and mackerel). All other finfish may only be taken commercially using one rod and reel with a max of two hooks, and recreational bag limits will apply.
3	Reading Rock	SMP	13.57		36-64	Offshore exposed rock rising from a soft bottom section of continental shelf.	No commercial fishing permitted. Recreational fishing is permitted for finfish and for those invertebrates currently allowed to be taken in state parks and beaches.
4	Trinidad	SMCA	50.32	19.47	0-46	Hard bottom, mixed hard/soft bottom, and soft bottom areas with extensive kelp canopy.	Recreational fishing is permitted. Commercial fishing permitted for salmon, albacore, market crab, sea urchin and coastal pelagic species (sardine, anchovy, herring, squid, and mackerel). All other finfish may only be taken commercially using one rod and
5	Patricks Point	SMR	10.15	5.98	0-29	Hard and soft bottom over varied depths. Kelp canopy and numerous exposed rocks.	No commercial or recreational fishing permitted.
6	Humboldt and Arcata Bays	SMCA	66.74	0.63	0-8	Soft bottom estuary with large productive tide flats. Numerous creeks and the Elk River provides estuarine.	No commercial fishing except for herring, shellfish, and marine aquaculture. Recreational fishing permitted.

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Table 1a. MPA designation, size, depth and habitat characteristics of each of the proposed MPAs within the northern region.

	Site	MPA Type	Total Size (km ²)	Shore Length (km)	Depth Range (m)	Habitats	Regulations
7	Eel	SMR	33.52	9.16	0-27	Major river mouth and rich, soft bottom sediments associated with freshwater runoff.	No commercial or recreational fishing permitted.
8	Kings Range	SMR	52.72	11.29	0-371	Hard bottom with strong local currents causing upwelling. Submarine canyon extends within one mile of the coast.	No commercial or recreational fishing permitted.
9	Lost Coast	SMR	48.43	13.57	0-423	Rock shoreline, hard and soft bottom. Semi protected from winds during spring and summer upwelling.	No commercial or recreational fishing permitted.
10	Shelter Cove	SMCA	42.40	13.79	0-57	Open coast and semi protected areas with rocky bottom. Nearshore submerges and wash rocks with soft sediments and sand further offshore.	Recreational fishing is permitted. Commercial fishing permitted for salmon, albacore, market crab, sea urchin and coastal pelagic species (sardine, anchovy, herring, squid, and mackerel). All other finfish may only be taken commercially using one rod and
11	Sinkyone	SMP	8.33	23.54	0-15	Exposed rocky coast with cliffs.	No commercial fishing permitted. Recreational fishing is permitted for finfish and for those invertebrates currently allowed to be taken in state parks and beaches. Recreational fishing from CPFVs is prohibited.
12	DeHaven	SMP	8.98	4.92	0-46	Very exposed tide pools, coves and caves. Small creeks flow into ocean.	No commercial fishing permitted. Recreational fishing is permitted for finfish and for those invertebrates currently allowed to be taken in state parks and beaches. Recreational fishing from CPFVs is prohibited.

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Table 1a. MPA designation, size, depth and habitat characteristics of each of the proposed MPAs within the northern region.

	Site	MPA Type	Total Size (km ²)	Shore Length (km)	Depth Range (m)	Habitats	Regulations
13	MacKerricher	SMR	1.82	7.09	0-11	Exposed coastline with hard bottom, bull kelp, and sandy areas.	No commercial or recreational fishing permitted.
14	Point Cabrillo	SMR	22.28	12.21	0-121	High relief hard bottom dispersed between soft bottom areas with small beaches.	No commercial or recreational fishing permitted.
15	Mendocino	SMCA	27.87	30.70	0-88	High relief hard bottom dispersed between soft bottom areas with small beaches. Kelp growth thanks to commercial fishing of sea urchins.	Recreational fishing is permitted. Commercial fishing permitted for salmon, albacore, market crab, sea urchin and coastal pelagic species (sardine, anchovy, herring, squid, and mackerel). All other finfish may only be taken commercially using one rod and
16	Russian Gulch	SMP	0.55	3.92	0-4	High relief bottom topography of the intertidal zone with extensive kelp.	No commercial fishing permitted. Recreational fishing is permitted for finfish and for those invertebrates currently allowed to be taken in state parks and beaches. Recreational fishing from CPFVs is prohibited.
17	Van Damme	SMP	0.38	2.04	0-9	Mixture of soft and hard bottom habitats with a small river emptying into a cove with a beach.	No commercial fishing permitted. Recreational fishing is permitted for finfish and for those invertebrates currently allowed to be taken in state parks and beaches. Recreational fishing from CPFVs is prohibited.
18	Greenwood	SMP	2.57	6.46	0-27	Varied and complicated bottom topography and types with a wide range of nearshore habitats.	No commercial fishing permitted. Recreational fishing is permitted for finfish and for those invertebrates currently allowed to be taken in state parks and beaches. Recreational fishing from CPFVs is prohibited.
19	Point Arena	SMR	17.28	8.98	0-52	Sandy bottom with rock pinnacles.	No commercial or recreational fishing permitted.

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Table 1b. MPA designation, size, depth and habitat characteristics of each of the proposed MPAs within the northern central region.

	Site	MPA Type	Total Size (km ²)	Shore Length (km)	Depth Range (m)	Habitats	Regulations
19	Point Arena	SMR	17.28	8.98	0-52	Sandy bottom with rock pinnacles.	No commercial or recreational fishing permitted.
20	Del Mar	SMR	0.31	0.93	0-12	Rocky subtidal habitat.	No commercial or recreational fishing permitted.
21	Salt Point	SMR	0.21	1.57	0-18	75% hard bottom.	No commercial or recreational fishing permitted. Presently in place.
22	Salt Point	SMP	7.13	4.76	0-67	Hard bottom with wash rocks, offshore rocks, boulder, cobble, graves and sand bottom.	No commercial fishing permitted. No recreational fishing for finfish permitted. Only recreational abalone, chitons, clams, cockles, crabs, ghost shrimps, sea urchins, squid, and sea cucumbers may be taken.
23	Fort Ross	SMR	0.99	3.35	0-31	75% hard bottom with wash rocks, offshore rocks, rock shelves, walls, boulders, cobble, gravel and sand bottom. Eel grass at sandy bottom depth 60 meters.	No commercial or recreational fishing permitted.
24	Sonoma Coast Beach	SMCA	36.30	6.94	0-77	80% hard bottom with rock shelves, walls, pinnacles, offshore rocks and islets. Boulder, graves and sand bottom.	No commercial or recreational fishing permitted, except for salmon.
25	Bodega	SMR	5.90	5.09	0-55	Rock outcropping in sandy bottom. Exposed coast, wash rocks, boulders, 60 percent rock 40 percent sand.	No commercial or recreational fishing permitted.
26	Estero Americano	SMR	1.37	0.19		Brackish, estuarine and marine, hypersaline, with shallow soft bottom.	No commercial or recreational fishing permitted.
27	Estero de San Antonia	SMR	1.17	0.46		Brackish, estuarine and marine, hypersaline, with shallow soft bottom.	No commercial or recreational fishing permitted.
28	Bird Rock	SMR	3.74	2.67	0-33	Offshore rock with sandy bottom.	No commercial or recreational fishing permitted.

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Table 1b. MPA designation, size, depth and habitat characteristics of each of the proposed MPAs within the northern central region.

	Site	MPA Type	Total Size (km ²)	Shore Length (km)	Depth Range (m)	Habitats	Regulations
29	Point Reyes Headlands	SMR	15.46	7.51	0-46	Rocky intertidal and subtidal pocket beaches with hard and soft bottom.	No commercial or recreational fishing permitted.
30	Duxbury Reef	SMCA	17.31	7.59	0-22	Monterey shale, rocky inter and subtidal.	No commercial or recreational fishing permitted, except for salmon.
31	Farallon Islands	SMR	17.89	9.75	0-51	Rocky intertidal and subtidal interspersed with urchin barrens and sandy flats.	No commercial or recreational fishing permitted.
32	Farallon Islands	SMCA	98.45		24-113	Mixture of soft and hard bottom habitats.	No commercial or recreational fishing permitted, except for salmon.
33	James V. Fitzgerald	SMR	14.74	8.11	0-34	Monterey shale, rocky inter and subtidal.	No commercial or recreational fishing permitted.
34	Año Nuevo	SMR	24.95	17.03	0-30	Rock reef, kelp, sand bottom	No commercial or recreational fishing permitted. Anchoring allowed south of Point Año Nuevo

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Table 1c. MPA designation, size, depth and habitat characteristics of each of the proposed MPAs within the southern central region.

	Site	MPA Type	Total Size (km ²)	Shore Length (km)	Depth Range (m)	Habitats	Regulations
35	Año Nuevo	SMCA	43.33	Offshore Año Nuevo SMR	18-64	Rock reef, kelp, sand bottom	No commercial or recreational fishing permitted, except for salmon. Anchoring allowed south of Point Año Nuevo
36	Natural Bridges	SMR	6.75	5.26	0-34	Shale reef, extensive kelp, sand bottom, rocky intertidal	No commercial or recreational fishing permitted.
37	Natural Bridges	SMCA	49.53	9.16	0-70	Shale reef, extensive kelp, sand bottom, rocky intertidal	No commercial fishing permitted except for salmon, albacore, sardine, anchovy, herring, and mackerel. Recreational fishing permitted.
38	Soquel Canyon	SMCA	54.1	Offshore Soquel Point, Santa Cruz	70-611	Submarine canyon with varied habitat (vertical rock walls, rock outcrops, soft sediment)	No commercial or recreational fishing permitted except for salmon, albacore, sardine, anchovy, herring, and mackerel.
39	Portuguese Ledge	SMCA	24.1	Offshore Point Pinos, Pacific Grove	88-205	Rock reef, soft bottom.	No commercial or recreational fishing permitted except for salmon, albacore, sardine, anchovy, herring, and mackerel.
40	Hopkins	SMR	0.9	2.9	0-20	Rock reef, soft bottom, kelp forests, rocky intertidal	No commercial or recreational fishing permitted.
41	Pacific Grove	SMCA	13.3	7.6	0-68	Rock reef, soft bottom, kelp forests, rocky intertidal	No commercial fishing permitted except for salmon, albacore, sardine, anchovy, squid, herring, kelp, and mackerel. Recreational fishing for finfish only permitted.

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Table 1c. MPA designation, size, depth and habitat characteristics of each of the proposed MPAs within the southern central region.

	Site	MPA Type	Total Size (km ²)	Shore Length (km)	Depth Range (m)	Habitats	Regulations
42	Carmel Bay	SMP	6.4	10.7	0-141	Rock reef, soft bottom, kelp forests, submarine canyon	No commercial fishing permitted. Recreational fishing allowed for all species except mollusks and crustaceans.
43	Point Lobos	SMR	2.8	12.4	0-59	Deep and shallow rock reefs, kelp forests, soft bottom, submarine canyon heads	No commercial or recreational fishing permitted.
44	Point Lobos	SMCA	29.4	7.6	0-530	Deep and shallow rock reefs, kelp forests, soft bottom, submarine canyon heads	No commercial or recreational fishing permitted except for salmon, albacore, sardine, anchovy, herring, mackerel, and by trap only-spot prawns.
45	Point Sur	SMCA	26.8	7.4	0-77	Deep and shallow rock reefs, kelp forests, soft bottom	No commercial or recreational fishing permitted except for salmon, albacore, sardine, anchovy, herring, and mackerel.
46	Julia Pfeiffer Burns	SMR	7.1	6.1	0-251	Rock reef, submarine canyon heads, kelp forests, sand, rocky intertidal	No commercial or recreational fishing permitted.
47	Big Creek	SMR	6.5	5	0-92	Deep and shallow rock reefs, kelp forests, soft bottom, submarine canyon heads	No commercial or recreational fishing permitted.
48	Big Creek	SMCA	23.9	2	0-729	Deep and shallow rock reefs, kelp forests, soft bottom, submarine canyon heads	No commercial or recreational fishing permitted except for salmon, albacore, sardine, anchovy, herring, and mackerel.
49	Salmon Creek	SMR	9.6	5.9	0-44	Rock reef, kelp forests, sand	No commercial or recreational fishing permitted.
50	Piedras Blancas	SMCA	28.8	9.7	0-99	Rock reef, kelp forests, soft bottom, rocky intertidal	No commercial or recreational fishing permitted except for salmon, albacore, sardine, anchovy, herring, and mackerel.

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Table 1c. MPA designation, size, depth and habitat characteristics of each of the proposed MPAs within the southern central region.

	Site	MPA Type	Total Size (km ²)	Shore Length (km)	Depth Range (m)	Habitats	Regulations
51	Cambria	SMCA	45	8.4	0-86	Rock reef, kelp forests, soft bottom	No commercial fishing permitted except for salmon, albacore, sardine, anchovy, herring, and mackerel. Recreational fishing permitted.
52	Cambria	SMR	17.8	6.7	0-99	Rock reef, kelp forests, soft bottom	No commercial or recreational fishing permitted.
53	Point Buchon	SMCA	8.7	7.4	0-49	Rock reef, kelp forests, soft bottom, offshore pinnacles	No commercial or recreational fishing permitted except for salmon, albacore, sardine, anchovy, herring, and mackerel.
54	Purisima	SMCA	15.5	9.6	0-31	Rock reef, kelp forests, soft bottom, rocky intertidal	No commercial fishing. Only recreational fishing for finfish by hook and line from shore.
55	Conception	SMP	190.07	36.92	0-140	Rock reef, sand, kelp beds, shipwrecks	No commercial fishing. Only recreational fishing for finfish by hook and line from shore.
56	Area Charlie (San Nicholas Is.)	SMR	66.4	8.44	0-711	Rocky reef, kelp forests, sand	No commercial or recreational fishing permitted. U.S. military exercises will not be restricted.

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Table 1d. MPA designation, size, depth and habitat characteristics of each of the proposed MPAs within the southern region.

	Site	MPA Type	Total Size (km ²)	Shore Length (km)	Depth Range (m)	Habitats	Regulations
55	Conception	SMP	190.07	36.92	0-140	Rock reef, sand, kelp beds, shipwrecks	No commercial fishing. Only recreational fishing for finfish by hook and line from shore.
57	Refugio	SMP	3.7	4.89	0-31	Rocky reef and ledges and sandy bottom.	No commercial fishing. No extraction of archaeological or geological resources.
58	Naples	SMCA	65.1	12.01	0-265	Rocky reef, kelp beds, and sandy bottom.	Commercial fishing for lobster and recreational fishing for lobster and finfish.
59	Coal Oil Point	SMR	27.2	5.42	0-163	Rocky reef, kelp beds	No commercial and recreational fishing.
60	Carpinteria	SMP	34.6	6.87	0-38	Rocky reef and sandy bottom.	No commercial fishing. Only recreational fishing for finfish by hook and line from shore.
61	Leo Carrillo	SMR	83.6	15.84	0-607	Rocky reef, boulders, rocky outcrops, kelp beds and deep water canyon.	No commercial and recreational fishing.
62	Santa Monica Bay	SMCA	236.9	53.26	0-373	Rocky reef, artificial reef and shale.	Current commercial and recreational regulations.
63	Lunada Bay	SMR	2.6	8.98	0-14	Rocky reef, boulders, flat rock, cobble, and coves.	No commercial and recreational fishing.
64	Abalone Cove	SMP	0.3	1.87	0-5	Rocky ledges.	Recreational finfishing only.
65	Point Fermin	SMR	0.6	1.91	0-15	Rocky reef, kelp beds, and sandy bottom.	No commercial and recreational fishing.
66	Crystal Cove	SMR	15.5	8.99	0-130	Platform reef, rocky intertidal.	No commercial and recreational fishing.
67	Laguna Intertidal	SMCA	2.7	10.23	0-16	Rocky intertidal.	No change in existing regulations.
68	Dana Point	SMR	9.0	5.59	0-49	Rocky and sandy bottom.	No commercial and recreational fishing.
69	Pendleton	SMR	72.3	12.38	0-64	Sandy beach, kelp beds.	No commercial and recreational fishing.
70	La Jolla	SMR	43.6	11.20	0-393	Rocky reef, deep water canyon, sandy bottom, kelp beds, and 2 artificial reefs.	No commercial and recreational fishing.

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Table 1d. MPA designation, size, depth and habitat characteristics of each of the proposed MPAs within the southern region.

	Site	MPA Type	Total Size (km ²)	Shore Length (km)	Depth Range (m)	Habitats	Regulations
71	Point Loma	SMR	29.7	6.11	0-104	Kelp beds, rocky intertidal, exposed shelves with boulder/cobble overlying pavement reef, rocky outcrops, boulders and surfgrass.	No commercial and recreational fishing.
72	West End	SMR	25.0	15.32	0-247	Rocky reef, kelp beds, and sandy bottom.	No commercial and recreational fishing.
73	East Side	SMCA	46.5	28.80	0-247	Rocky reef, kelp beds, and sandy bottom.	Current commercial and recreational regulations.
74	Wrigley Institute of Environmental Science	SMR	8.1	5.57	0-269	Rocky reef, kelp beds, and sandy bottom.	No commercial and recreational fishing.
75	Avalon Bay	SMP	14.9	5.59	0-115	Rocky reef, kelp beds and sandy bottom.	No commercial fishing and no recreational fishing from commercial passenger fishing vessels.
76	Farnsworth	SMP	4.3		40-104	Kelp beds, rocky reef, pinnacles, and sandy bottom.	No anchoring or commercial fishing. Recreational fishing for pelagic species, including yellowtail, tunas, mackerel, sardines, anchovy and barracuda.
77	San Clemente Castle Rock	SMR	44.0	3.78	0-947	Kelp beds, rocky reef, pinnacles, and sandy bottom.	No commercial and recreational fishing.
78	East San Clemente	SMR	10.2	4.11	0-419	Kelp beds, rocky reef, pinnacles, and sandy bottom.	No commercial and recreational fishing.
79	San Clemente China Point	SMR	76.54	13.08	0-419	Kelp beds, rocky reef, pinnacles, and sandy bottom.	No commercial and recreational fishing.

Table 2. Summary of the number, the size, and percent representation of each MPA type in each region designated for consideration under the Marine Life Protection Act.

TYPE	STATISTIC	NORTH	NORTH CENTRAL	SOUTH CENTRAL	SOUTH	TOTAL
SMCA	Number	5	3.45	11.55	4	24
SMP	Number	6	1	1.99	5.01	14
SMR	Number	7.53	10.88	8.59	14	41
TOTAL	Number	18.53	15.33	22.13	23.01	79
SMCA	Average Size (km ²)	43.8	42.9	28.6	87.8	45.2
SMP	Average Size (km ²)	5.7	7.1	98.3	9.9	21.1
SMR	Average Size (km ²)	26.1	6.7	14.7	32.0	21.2
SMCA	Standard Deviation	15.6	34.9	14.2	102.8	46.0
SMP	Standard Deviation	5.4	na	129.9	13.2	49.5
SMR	Standard Deviation	18.7	6.5	20.1	28.2	22.8
SMCA	Maximum Size (km ²)	66.8	98.5	54.1	236.9	236.9
SMP	Maximum Size (km ²)	13.6	7.1	190.2	34.6	190.2
SMR	Maximum Size (km ²)	52.8	25.0	66.4	83.6	83.6
SMCA	Minimum Size (km ²)	27.9	17.3	8.7	2.7	2.7
SMP	Minimum Size (km ²)	0.4	7.1	6.4	0.3	0.3
SMR	Minimum Size (km ²)	1.8	0.2	0.9	0.570	0.2
SMCA	Median Size (km ²)	30.9	27.9	25.4	55.8	34.0
SMP	Median Size (km ²)	45.4	7.1	98.3	4.0	6.8
SMR	Median Size (km ²)	26.6	4.8	7.1	26.1	14.7
TOTAL	Area in State Waters	2,430.1	1,908.0	3215.2	3662.8	11216.1
SMCA	Network Size (km ²) (Percent of Total)	219.2 (9.0%)	171.6 (9.0%)	343.3 (10.7%)	351.3 (9.6%)	1085.4 (9.7%)
SMP	Network Size (km ²) (Percent of Total)	34.4 (1.4%)	7.1 (0.4%)	194.9 (6.1%)	59.4 (1.6%)	295.9 (2.6%)
SMR	Network Size (km ²) (Percent of Total)	209.0 (8.6%)	80.4 (4.2%)	132.5 (4.1%)	448.1 (12.2%)	869.8 (7.8%)
MPA	Network Size (km ²) (Percent of Total)	472.6 (19.0%)	259.1 (13.6%)	670.7 (20.8%)	858.8 (23.5%)	2251.1 (20.1%)

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Table 3. Amount of area (km²) and percent of total area in state waters of habitat from 0-30 m protected in MPAs.

Region	State Waters	SMR	SMP	SMCA	TOTAL IN MPAS
North	1184.2	86.8 (7.3%)	18.3 (1.5%)	152.5 (12.9%)	257.7 (21.7%)
North Central	784.0	61.1 (7.8%)	2.1 (0.3%)	36.7 (4.7%)	99.9 (12.8%)
South Central	1259.1	32.4 (2.6%)	62.5 (5%)	78.0 (6.2%)	173.0 (13.6%)
South	1464.6	135.3 (9.2%)	24.1 (1.6%)	144.7 (9.9%)	304.1 (20.7%)
Total State Waters	4691.8	315.7 (6.7%)	107.1 (2.3%)	411.9 (8.8%)	834.7 (17.8%)

Table 4. Amount of area (km²) and percent of total area in state waters of shallow continental shelf habitat (30-100 m) protected in MPAs.

Region	State Waters	SMR (km²)	SMP (km²)	SMCA (km²)	TOTAL IN MPAS
North	1087.5	101.0 (9.3%)	15.1 (1.4%)	46.5 (4.3%)	162.6 (14.8%)
North Central	1110.0	21.9 (2%)	4.9 (0.4%)	151.8 (13.7%)	178.6 (16.1%)
South Central	1998.7	52.8 (2.6%)	125.0 (6.3%)	166.4 (8.3%)	344.1 (17.2%)
South	1594.4	170.8 (10.7%)	32.4 (2%)	170.4 (10.7%)	373.7 (23.4%)
Total State Waters	5790.6	346.4 (6%)	177.4 (3.1%)	535.0 (9.2%)	1058.9 (18.3%)

Table 5. Amount of area (km²) and percent of total area in state waters of deep continental shelf habitat (100-200 m) protected in MPAs.

Region	State Waters	SMR (km²)	SMP (km²)	SMCA (km²)	TOTAL IN MPAS
North	129.3	19.4 (15%)	0	14.2 (11%)	33.6 (26%)
North Central	11.2	0	0	6.6 (59%)	6.6 (59%)
South Central	299.8	9.6 (3.2%)	8.0 (2.7%)	35.7 (11.9%)	53.3 (17.8%)
South	505.5	75.3 (14.9%)	0.8 (0.2%)	23.8 (4.7%)	99.8 (19.7%)
Total State Waters	945.8	104.3 (11%)	8.8 (0.9%)	80.2 (8.5%)	193.3 (20.4%)

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Table 6. Amount of area (km²) and percent of total area in state waters of giant kelp protected in MPAs. (Data imaging technique leads to an underestimate of actual area.)

Region	State Waters	SMR	SMP	SMCA	TOTAL IN MPAS
North	5.9	0.8 (13%)	0.6 (10%)	1.5 (25%)	2.9 (48%)
North Central	8.7	1.0 (12%)	0	0.01 ($<0.1\%$)	1.01 (12%)
South Central	58.6	7.9 (13%)	2.7 (5%)	5.8 (10%)	16.4 (28%)
South	30.3	7.6 (25%)	1.9 (6%)	1.3 (4%)	10.8 (35%)
Total State Waters	103.6	17.2 (17%)	5.2 (5%)	8.6 (8%)	31.0 (30%)

Table 7. Number of major submarine canyons protected in MPAs and percent of total in state waters.

Region	SMR	SMP	SMCA	TOTAL IN MPAS
North	2 (50%)	0	0	2 (50%)
North Central	0	0	0	0
South Central	0	0	2 (22%)	2 (22%)
South	2 (25%)	0	1 (13%)	3 (38%)
Total	4 (19%)	0	3 (14%)	7 (33%)

Table 8. Distributions, depth ranges, and preferred habitats of selected marine invertebrates and fishes along the western coast of North America.

Common Name	Scientific Name	Depth Range (m)	Habitat
Pacific Littleneck Clam	<i>Protothaca staminea</i>	0 - 10 m	bays, estuaries, protected coasts
Manila Clam	<i>Tapes philippinarum</i>	0 - 1 m	bays, estuaries, protected coasts
Pismo Clam	<i>Tivela stultorum</i>	0 - 10 m	high energy beaches
Geoduck Clam	<i>Pan pe abrupta</i>	0 - 110 m	bays, sloughs, estuaries, stable sand, mud
Pink Abalone	<i>Haliotis corrugata</i>	5-25 m	protected, rocky bottom areas
Black Abalone	<i>Haliotis cracherodii</i>	intertidal	exposed rocky bottom areas
Green Abalone	<i>Haliotis fulgens</i>	intertidal-10 m	exposed rocky bottom areas
Pinto Abalone	<i>Haliotis kamtschatkana</i>	intertidal-5 m	exposed rocky bottom
Red Abalone	<i>Haliotis rufescens</i>	2-30 m, occasionally 180 m	exposed rocky bottom
White Abalone	<i>Haliotis sorenseni</i>	25-30 m, occasionally 5-65 m	rocky bottom
Flat Abalone	<i>Haliotis walallensis</i>	intertidal – 27 m	rocky bottom
Northern Pink Shrimp	<i>Pandalus borealis</i>	adults 50-200 m	clay, mud, sand, silt
Ocean Pink Shrimp	<i>Pandalus jordani</i>	adults 50-300 m, juveniles 50-160 m, larvae neritic	green mud or mud-sand
Ridgeback Prawn	<i>Sicyonia ingentis</i>	5-305 m, adults 45-180 m, juveniles 25-50 m	soft substrates
Spot Shrimp	<i>Pandalu platyceros</i>	adults 50-530 m, juveniles 0-55 m	among green, red, and brown algae, kelp, and sea grasses on rocky bottoms
Dungeness Crab	<i>Cancer magister</i>	adults intertidal-90 m, occasionally 230 m, juveniles intertidal-50 m, occasionally 180.	sand, occasionally associated with eelgrass
California Spiny Lobster	<i>Panulirus interruptus</i>	adults intertidal -30 m, occasionally to 80 m, juveniles intertidal - 5 m.	adults in rocky areas and crevices, juveniles in mussel beds and surfgrass
Spiny Dogfish	<i>Squalus acanthias</i>	adults and juveniles 50-350, occasionally 900 m	muddy bottoms
Northern Anchovy	<i>Engraulis mordax</i>	adults neritic to oceanic, from surf to 160 km offshore, from surface to 300 m, juveniles epipelagic near shore and estuarine	
Coho Salmon	<i>Oncorhynchus kisutch</i>	surface-100 m	shore to 1200 km offshore
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	surface-100 m	shore to 1200 km offshore
Steelhead	<i>Oncorhynchus mykiss</i>	surface-30 m	shore to 1200 km offshore
Pacific Cod	<i>Gadus macrocephalus</i>	adults 50-300 m, occasionally 0-875 m, larvae epipelagic	soft, mud, clay and sand

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Common Name	Scientific Name	Depth Range (m)	Habitat
Walleye Pollock	<i>Theragra chalcogramma</i>	adults usually 50-300 m, occasionally 975 m, juveniles 25-400 m	euhaline waters
Pacific Hake	<i>Merluccius productus</i>	adults 50-500 m, occasionally 920, juveniles neritic, young juveniles surface to 200 m	euhaline waters
Jack Mackerel	<i>Trachurus symmetricus</i>	adults 9-73 m, occasionally 403 m, spawning 9-50 m, juveniles 9-55 m,	euhaline waters
Albacore	<i>Thunnus alalunga</i>	adults 20-200 m, occasionally 600 m, juveniles 20-30 m, occasionally 50 m	pelagic
Blue Fin Tuna	<i>Thunnus thynnus</i>	surface - 200 m	epipelagic and neritic
Chub Mackerel	<i>Scomber japonicus</i>	adults surface-150 m, occasionally 300 m, juveniles 0-75 m, spawning 0-50 m	pelagic
Kelp Bass	<i>Paralabrax clathratus</i>	adults 2-21 m, occasionally 57 m, juveniles 8-20, in kelp	kelp beds
Striped Bass	<i>Morone saxatilis</i>	adults surface-45 m, juveniles surface to 30 m	adults riverine-marine, juveniles riverine-estuarine
Pacific Bonito	<i>Sarda chiliensis</i>	surface to 88 m	epipelagic-neritic
California Halibut	<i>Paralichthys californicus</i>	adults surf to 60 m, occasionally 185 m, larvae neritic estuarine 12-45 m, juveniles in bays and estuaries	
Pacific Barracuda	<i>Sphyraena argentea</i>	juveniles nearshore 1-5 m, adults neritic to 20 m	juveniles over sand in protected bays or near rocks
Yellowtail	<i>Seriola lalandei</i>	surface to 70 m	mostly coastal, often near kelp beds along rocky inshore areas near points and over offshore pinnacles and banks
Pacific Ocean Perch	<i>Sebastes alutus</i>	adults 100-450 m, occasionally 825 m, juveniles surface to 250 m	over rough or rocky bottom, gravel and rocky slopes
Widow Rockfish	<i>Sebastes entomelas</i>	adults 100-300 m, occasionally 366 m, juveniles 9-37 m	rocky banks, seamounts, ridges near canyons, headlands, and muddy bottoms near rocks
Sablefish	<i>Anoplopoma fimbria</i>	adults 150-1000 m, occasionally deeper, juveniles shore to 100 m, occasionally to 200 m, spawning 200-1000 m	mud and clay bottom

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Common Name	Scientific Name	Depth Range (m)	Habitat
Lingcod	<i>Ophiodon elongatus</i>	adults in tidepools to 300 m, occasionally 475 m, juveniles intertidal to 150 m	mud and sand to rocky areas, well vegetated rocky reefs with strong tidal currents
Pacific Halibut	<i>Hippoglossus stenolepis</i>	adults surf zone to 500 m, occasionally 1100 m, juveniles surf zone to 370 m	gravel, sand, mud and clay
English Sole	<i>Parophrys vetulus</i>	adults intertidal to 100 m, occasionally 550 m, juveniles intertidal to 50 m, occasionally 200 m	mud and sand
Flathead Sole	<i>Hippoglossoides elassodon</i>	adults nearshore to 200 m, occasionally 875 m, juveniles intertidal to 200 m, occasionally 500 m	silty mud to sandy gravel
Petrale Sole	<i>Eopsetta jordani</i>	adults surf zone to 300 m, occasionally 500 m, juveniles 25-145 m, spawning 300-400 m	sandy bottoms, occasionally muddy sand or mud
Starry Flounder	<i>Platichthys stellatus</i>	adults to 150 m, occasionally to 375 m, juveniles in estuaries and river mouths to 50 m, occasionally 100 m, spawning 0-50 m	sand and mud
Dover Sole	<i>Microstomus pacificus</i>	adults 200-300 m, occasionally deeper (to 1450 m), juveniles 10-200 m, occasionally to 700 m, spawning 80-600 m	soft muddy bottom
Arrowtooth Flounder	<i>Atheresthes stomias</i>	adults 50 - 500 m, young juveniles 18-200 m, spawning 100-300 m	sand and sand-gravel, occasionally low relief rock-sponge bottom

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Table 9. The number of marine invertebrates and vertebrates (listed in Table 8) contained within each of the proposed marine protected areas in the Master Plan. Species distributions were determined using a combination of depth preferences and distribution maps from "West Coast of North America: Coastal and Ocean Zones Strategic Assessment: Data Atlas." United States Department of Commerce, NOAA. Invertebrate and Fish Volume. September 1990.

	NAME	TYPE	SIZE	INVERTS	VERTS	RICHNESS
Total number listed in Table 8				10	29	39
1	Saint George Reef	SMR	30.9	5	26	31
2	Castle Rock	SMCA	31.7	5	24	29
3	Reading Rock	SMP	13.6	5	26	31
4	Patricks Point	SMR	10.2	7	29	36
5	Trinidad	SMCA	50.3	7	29	36
6	Humboldt and Arcata Bays	SMCA	66.8	5	20	25
7	Eel	SMR	33.5	5	24	29
8	Kings Range	SMR	52.8	7	29	36
9	Lost Coast	SMR	48.5	7	29	36
10	Shelter Cove	SMCA	42.4	7	26	33
11	Sinkyone	SMP	8.3	5	20	25
12	De Haven	SMP	9.0	5	24	29
13	Mac Kerricher	SMR	1.8	5	20	25
14	Point Cabrillo	SMR	22.3	7	28	35
15	Russian Gulch	SMP	0.6	5	20	25
16	Mendocino	SMCA	27.9	7	28	35
17	Van Damme	SMP	0.4	5	20	25
18	Greenwood	SMP	2.6	5	22	27
19	Point Arena	SMR	17.3	7	27	34
20	Del Mar Point	SMR	0.3	5	22	27
21	Salt Point	SMR	0.2	5	20	25
22	Salt Point	SMP	7.1	7	28	35
23	Fort Ross	SMR	1.0	5	25	30
24	Sonoma Coast Beach	SMCA	36.3	7	28	35
25	Estero Americano	SMR	1.4	1	6	7
26	Bodega	SMR	5.9	7	25	32
27	Estero de San Antonio	SMR	1.2	1	6	7
28	Bird Rock	SMR	3.8	5	24	29
29	Point Reyes Headlands	SMR	15.5	7	26	33
30	Duxbury Reef	SMCA	17.3	5	21	26
31	Farallon Islands	SMR	17.9	3	24	27
32	Farallon Islands	SMCA	98.5	4	24	28
33	Fitzgerald	SMR	14.7	5	24	29
34	Año Nuevo	SMCA	43.3	5	24	29
35	Año Nuevo	SMR	25.0	5	24	29

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	NAME	TYPE	SIZE	INVERTS	VERTS	RICHNESS
36	Natural Bridges	SMR	6.8	5	24	29
37	Natural Bridges	SMCA	49.6	7	28	35
38	Soquel Canyon	SMCA	54.1	4	25	29
39	Portuguese Ledge	SMCA	24.1	5	23	28
40	Hopkins	SMR	0.9	7	20	27
41	Pacific Grove	SMCA	13.3	9	26	35
42	Carmel Bay	SMP	6.4	9	28	37
43	Point Lobos	SMR	2.8	9	27	36
44	Point Lobos	SMCA	29.7	9	28	37
45	Point Sur	SMCA	26.8	9	26	35
46	Julia Pfeiffer Burns	SMR	7.1	9	26	35
47	Big Creek	SMR	6.4	9	25	34
48	Big Creek	SMCA	24.0	9	26	35
49	Salmon Creek	SMR	9.7	7	21	28
50	Piedras Blancas	SMCA	28.8	9	25	34
51	Cambria	SMCA	45.0	9	25	34
52	Cambria	SMR	17.8	9	25	34
53	Point Buchon	SMCA	8.7	9	21	30
54	Purisima Point	SMCA	15.5	7	20	27
55	Conception	SMP	190.2	10	23	33
56	Refugio	SMP	3.7	5	19	24
57	Naples	SMCA	65.1	9	23	32
58	Coal Oil Point	SMR	27.2	9	22	31
59	Carpenteria	SMP	34.6	4	19	23
60	Leo Carrillo	SMR	83.6	9	22	31
61	Santa Monica Bay	SMCA	236.9	6	22	28
62	Lunada Bay	SMR	2.6	5	13	18
63	Abalone Cove	SMP	0.3	5	13	18
64	Point Fermin	SMR	0.6	5	13	18
65	Crystal Cove	SMR	15.5	9	19	28
66	Laguna Intertidal	SMCA	2.7	5	13	18
67	Dana Point	SMR	9.0	9	16	25
68	Pendleton	SMR	72.3	8	16	24
69	La Jolla	SMR	43.6	9	20	29
70	Point Loma	SMR	29.7	9	17	26
71	West End	SMR	25.0	9	16	25
72	East Side	SMCA	46.5	8	16	24
73	Wrigley Institute of Environment	SMR	8.1	8	16	24
74	Avalon Bay	SMP	14.9	8	16	24
75	Farnsworth	SMP	4.3	8	16	24
76	San Clemente Castle Rock	SMR	44.0	8	16	24
77	East San Clemente	SMR	10.2	8	16	24
78	San Clemente China Point	SMR	76.6	8	16	24
79	Area Charlie	SMR	66.4	8	17	25

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Table 10. The number of proposed marine protected areas in each region along the California coast that are likely to contain (or did contain in the past) the following marine invertebrates. Species distributions were determined using a combination of depth preferences and distribution maps from “West Coast of North America: Coastal and Ocean Zones Strategic Assessment: Data Atlas.” United States Department of Commerce, NOAA. Invertebrate and Fish Volume. September 1990.

	NORTH	NORTH CENTRAL	SOUTH CENTRAL	SOUTH	TOTAL
Number of MPAs	18.53	15.33	22.13	23.01	79
Pinto Abalone	19	14	20	22	71
Red Abalone	19	15	20	21	71
White Abalone	0	0	1	22	22
Flat Abalone	19	13	20	25	73
Northern Pink Shrimp	8	5	16	11	38
Ocean Pink Shrimp	8	5	16	19	46
Ridgeback Prawn	0	0	17	21	37
Spot Shrimp	19	15	22	21	73
Dungeness Crab	19	17	22	2	56
Spiny Lobster	0	0	16	25	40

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Table 11. The number of proposed marine protected areas in each region along the California coast that are likely to contain (or did contain in the past) the following fishes. Species distributions were determined using a combination of depth preferences and distribution maps from "West Coast of North America: Coastal and Ocean Zones Strategic Assessment: Data Atlas." United States Department of Commerce, NOAA. Invertebrate and Fish Volume. September 1990.

	NORTH	NORTH CENTRAL	SOUTH CENTRAL	SOUTH	TOTAL
Number of MPAs	18.53	15.33	22.13	23.01	79
Spiny Dogfish	8	2	15	17	41
Northern Anchovy	19	17	22	25	79
Coho Salmon	19	17	12	0	45
Chinook Salmon	19	17	22	3	57
Steelhead	19	17	19	0	52
Pacific Cod	19	15	22	7	59
Walleye Pollock	10	7	7	0	23
Pacific Hake	9	4	14	9	34
Jack Mackerel	11	12	19	21	59
Albacore	10	5	16	19	48
Blue Fin Tuna	19	15	22	25	77
Chub Mackerel	19	15	22	25	77
Kelp Bass	17	15	20	25	73
Striped Bass	17	17	20	15	65
Pacific Bonito	19	15	20	25	75
California Halibut	19	15	20	25	75
Pacific Barracuda	19	15	22	25	77
Yellowtail	19	15	22	25	77
Pacific Ocean Perch	6	0	6	6	18
Widow Rockfish	14	14	22	21	67
Sablefish	19	15	22	25	77
Lingcod	19	15	22	25	77
Pacific Halibut	19	14	22	1	52
English Sole	19	15	22	17	69
Flathead Sole	19	15	5	0	36
Petrale Sole	19	15	22	25	77
Starry Flounder	19	17	22	7	61
Dover Sole	14	14	22	17	63
Arrowtooth Flounder	13	9	17	0	36

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Table 12. Habitat requirements and distribution of each of the 19 fish species targeted by the Nearshore Fishery Management Plan and the percent of their habitat* contained within the proposed MPAs.

Species	Geographic Range and Habitat Preferences	SMR (%)	SMP (%)	SMCA (%)	Total MPA (%)
California Scorpionfish <i>Scorpaena guttata</i>	Santa Cruz, California south along the Pacific coast of Baja California and into the Gulf of California. Found on rocky reefs from the intertidal to 190 m.	7.5	4.7	15.8	28
Kelp Rockfish <i>Sebastes atrovirens</i>	Timber Cove, northern California to Punta San Pablo, central Baja California; most abundant between northern Baja and central California. Found on shallow rocky reefs from 0-20 m.	7.5	4.6	15.8	28
Brown Rockfish <i>Sebastes auriculatus</i>	southeast Alaska to Hipolito Bay, central Baja California. Found on shallow rocky reefs from 0-60 m.	7.5	4.7	15.8	28
Gopher Rockfish <i>Sebastes carnatus</i>	Eureka, California to San Roque, central Baja California; most common from Mendocino County, California to Santa Monica Bay. Found on shallow rocky reefs from 0-40 m.	7.5	4.6	15.8	28
Copper Rockfish <i>Sebastes caurinus</i>	northern Gulf of Alaska to central Baja California. Found on rocky reefs from 0-190 m.	7.5	4.7	15.8	28

* Percent of region-wide rocky reef (by presence of kelp across species depth range) within each type of MPA. This estimate of the relative proportion of rocky reef within MPAs is an overestimate because the proposed MPAs tend to be located in areas that support kelp beds. Extensive reef areas outside of MPA's (e.g., exposed coastlines) are not included in these estimates.

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Table 12. Habitat requirements and distribution of each of the 19 fish species targeted by the Nearshore Fishery Management Plan and the percent of their habitat* contained within the proposed MPAs.

Species	Geographic Range and Habitat Preferences	SMR (%)	SMP (%)	SMCA (%)	Total MPA (%)
Black & Yellow Rockfish <i>Sebastes chrysomelas</i>	Eureka, northern California to Isla San Natividad, central Baja California; less common south of San Diego, California. Found on shallow rocky reefs from 0-20 m.	7.5	4.7	15.8	28
Calico Rockfish <i>Sebastes dallii</i>	Sebastian Viscaino Bay, Baja California to San Francisco. Found in rocky areas with mud-rock or sand-mud interface from 20 to 260 m.	unknown	unknown	unknown	unknown
China Rockfish <i>Sebastes nebulosus</i>	most abundant from southeastern Alaska to Sonoma County, California. Found on shallow rocky reefs from 10-90 m.	7.7	4.7	18.7	31
Quillback Rockfish <i>Sebastes maliger</i>	Gulf of Alaska to San Miguel Island in southern California; common between southeast Alaska and northern California. Found in rocky reefs and rocky-sand interface from 0-270 m.	7.5	4.7	15.8	28
Black Rockfish <i>Sebastes melano ps</i>	Amchitka Island, Alaska to Santa Monica Bay in southern California; uncommon south of Santa Cruz, California. Found on shallow rocky reefs from 0-80 m.	7.5	4.7	15.8	28

* Percent of region-wide rocky reef (by presence of kelp across species depth range) within each type of MPA. This estimate of the relative proportion of rocky reef within MPAs is an overestimate because the proposed MPAs tend to be located in areas that support kelp beds. Extensive reef areas outside of MPA's (e.g., exposed coastlines) are not included in these estimates.

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Table 12. Habitat requirements and distribution of each of the 19 fish species targeted by the Nearshore Fishery Management Plan and the percent of their habitat* contained within the proposed MPAs.

Species	Geographic Range and Habitat Preferences	SMR (%)	SMP (%)	SMCA (%)	Total MPA (%)
Blue Rockfish <i>Sebastes mystinus</i>	Bering Sea to Punta Banda, Baja California; less common south of the northern Channel Islands and north of Eureka, California. Found on shallow rocky reefs from 0-90 m.	7.5	4.7	15.8	28
Grass Rockfish <i>Sebastes rastrelliger</i>	Yaquina Bay, Oregon to Bahia Playa Maria, central Baja California; most common from northern California south. Found on shallow rocky reefs from the intertidal to 10 m.	7.4	4.7	13.5	28
Olive Rockfish <i>Sebastes serrano ides</i>	southern Oregon to central Baja California; common from Cape Mendocino to Santa Barbara and the northern Channel Islands. Found on the water column above rocky reefs from 0-180 m.	7.5	4.7	15.8	28
Treefish <i>Sebastes serriceps</i>	Cedros Island, Baja California to San Francisco. Found on shallow rocky reefs from 0-50 m.	7.5	4.6	15.8	28
Cabazon <i>Scorpaenichthys marmoratus</i>	Point Abrejos, Baja California to Sitka, Alaska. Found on shallow rocky reefs from the intertidal to 80 m.	7.5	4.7	15.8	28
Kelp Greenling <i>Hexagrammos decagrammus</i>	La Jolla, California to the Aleutian Islands in Alaska. Found on shallow rocky reefs from 0-50 m.	7.5	4.6	15.8	28

* Percent of region-wide rocky reef (by presence of kelp across species depth range) within each type of MPA.

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Table 12. Habitat requirements and distribution of each of the 19 fish species targeted by the Nearshore Fishery Management Plan and the percent of their habitat* contained within the proposed MPAs.

Species	Geographic Range and Habitat Preferences	SMR (%)	SMP (%)	SMCA (%)	Total MPA (%)
Rock Greenling	Bering Sea to Point Conception, California. Found on shallow rocky reefs from the intertidal to 20 m.	7.5	4.6	15.8	28
Monkeyface Prickleback <i>Cebidichthys violaceus</i>	San Quintin Bay, Baja California to southern Oregon. Found on shallow rocky reefs from the intertidal to 25 m.	7.5	4.6	15.8	28
California Sheephead <i>Semicossyphus pulcher</i>	Monterey Bay, California, south into the Gulf of California, Mexico; uncommon north of Point Conception. Found on shallow rocky reefs from 0-90 m.	7.5	4.7	15.8	28

* Percent of region-wide rocky reef (by presence of kelp across species depth range) within each type of MPA. This estimate of the relative proportion of rocky reef within MPAs is an overestimate because the proposed MPAs tend to be located in areas that support kelp beds. Extensive reef areas outside of MPA's (e.g., exposed coastlines) are not included in these estimates.

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Table 13. List of nearshore fishery species identified in the Marine Life Management Act that are present and commercially or recreationally fished within each proposed MPA sites.

Site	MPA Type	Fishing Blocks	California Scorpion Fish <i>Scorpaena guttata</i>	Kelp Rockfish <i>Sebastes atrovirens</i>	Brown Rockfish <i>Sebastes auriculatus</i>	Gopher Rockfish <i>Sebastes carnatus</i>	Copper Rockfish <i>Sebastes caurinus</i>	Black & Yellow Rockfish <i>Sebastes chrysomelas</i>
1 Año Nuevo	SMR	501, 502		x	x	xx	xx	xx
2 Año Nuevo	SMCA	501, 502		x	x	?	xx	?
3 Natural Bridges	SMR	509		x	x	x	x	xx
4 Natural Bridges	SMCA	509		x	x	x	x	xx
5 Soquel Canyon	SMCA	15% of each of 508, 509, 517, 518						
6 Portuguese Ledge	SMCA	517		?			x	
7 Hopkins	SMR	526	x	x	x	x	x	x
8 Pacific Grove	SMCA	526	x	xx	x	xx	xx	xx
9 Carmel Bay	SMP	526	x	x	x	x	x	x
10 Point Lobos	SMR	526	x	x	x	x	x	x
11 Point Lobos	SMCA	526, 532	x	xx	x	xx	xx	xx
12 Point Sur	SMCA	539	x	x	x	xx	xx	xx
13 Julia Pfeiffer Burns	SMR	538, 548	x	x	x	xx	x	x
14 Big Creek	SMR	547	x	x	x	xx	x	x
15 Big Creek	SMCA	548	x	x	x	xx	x	x
16 Salmon Creek	SMR	561	x	x	x	xx	x	x
17 Piedras Blancas	SMCA	560, 561, 602	x	xx	xx	xx	xx	xx
18 Cambria	SMCA	601, 602	x	xx	x	xx	xx	x
19 Cambria	SMR	601	x	xx	x	xx	xx	x
20 Point Buchon	SMCA	615	x	xx	xx	xx	xx	xx
21 Purisima	SMCA	637	x	x	x	xx	x	x
22 Conception	SMP	643, 644, 657, 658	x	x	x	xx	xx	x
23 Area Charlie (San Nicholas)	SMR	813	xx*	x	x	xx	xx	x

x indicates presence of the species

xx indicates presence and commercial fishing of the species

xx* indicates presence and recreational fishing of the species

xxx indicates presence and commercial and recreational fishing of the species

Table 13. List of nearshore fishery species identified in the Marine Life Management Act that are present and commercially or recreationally fished within each proposed MPA sites.

Site	MPA Type	Fishing Blocks	Calico Rockfish <i>Sebastes dallii</i>	China Rockfish <i>Sebastes nebulosus</i>	Quillback Rockfish <i>Sebastes maliger</i>	Black Rockfish <i>Sebastes melanops</i>	Blue Rockfish <i>Sebastes mystinus</i>	Grass Rockfish <i>Sebastes rastrelliger</i>
1 Año Nuevo	SMR	501, 502	x	x	x	xx	x	xx
2 Año Nuevo	SMCA	501, 502	x	x	x	xx	x	?
3 Natural Bridges	SMR	509	x	xx	x	x	x	xx
4 Natural Bridges	SMCA	509	x	x	x	x	x	xx
5 Soquel Canyon	SMCA	15% of each of 508, 509, 517, 518						
6 Portuguese Ledge	SMCA	517		xx	x	xx	xx	
7 Hopkins	SMR	526	x	x	x	x	x	x
8 Pacific Grove	SMCA	526	x	xx	x	xx	xx	xx
9 Carmel Bay	SMP	526	x	x	x	x	x	x
10 Point Lobos	SMR	526	x	x	x	x	x	x
11 Point Lobos	SMCA	526, 532	x	xx	x	xx	xx	xx
12 Point Sur	SMCA	539	x	xx	x	xx	xx	xx
13 Julia Pfeiffer Burns	SMR	538, 548	x	x	x	x	x	xx
14 Big Creek	SMR	547	x	x	x	x	x	x
15 Big Creek	SMCA	548	x	x	x	x	x	xx
16 Salmon Creek	SMR	561	x	x	x	x	xx	xx
17 Piedras Blancas	SMCA	560, 561, 602	x	xx	x	xx	xx	xx
18 Cambria	SMCA	601, 602	x	x	x	x	xx	xx
19 Cambria	SMR	601	x	x	x	x	xx	xx
20 Point Buchon	SMCA	615	x	xx	x	xx	xx	xx
21 Purisima	SMCA	637	x	x	x	x	xx	xx
22 Conception	SMP	643, 644, 657, 658	x	x	x	x	x	xx
23 Area Charlie (San Nicholas)	SMR	813	x	x	x		xx	xx

x indicates presence of the species

xx indicates presence and commercial fishing of the species

xx* indicates presence and recreational fishing of the species

xxx indicates presence and commercial and recreational fishing of the species

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Table 13. List of nearshore fishery species identified in the Marine Life Management Act that are present and commercially or recreationally fished within each proposed MPA sites.

Site	MPA Type	Fishing Blocks	Olive Rockfish <i>Sebastes serrano ides</i>	Treefish <i>Sebastes serripes</i>	Cabezon <i>Scorpaenichthys marmoratus</i>	Kelp/Rock Greenling <i>H. decagrammus</i>	Monkey-face Prickle-back <i>C. violaceus</i>	California Sheephead <i>Semioscyphus pulcher</i>
1 Año Nuevo	SMR	501, 502	x		xxx	xx*	xx	
2 Año Nuevo	SMCA	501, 502	x		xxx	?	?	
3 Natural Bridges	SMR	509	x		xx	x	x	
4 Natural Bridges	SMCA	509	x		xx	x	x	
5 Soquel Canyon	SMCA	15% of each of 508, 509, 517, 518						
6 Portuguese Ledge	SMCA	517						
7 Hopkins	SMR	526	x	x	x	x	x	x
8 Pacific Grove	SMCA	526	xx	x	xx	x	xx	x
9 Carmel Bay	SMP	526	x	x	x	x	x	x
10 Point Lobos	SMR	526	x	x	x	x	x	x
11 Point Lobos	SMCA	526, 532	xx	x	x	x	xx	x
12 Point Sur	SMCA	539	x	x	x	xx	xx	x
13 Julia Pfeiffer Burns	SMR	538, 548	x	x	x	x	x	x
14 Big Creek	SMR	547	x	x	x	x	x	x
15 Big Creek	SMCA	548	x	x	x	x	x	x
16 Salmon Creek	SMR	561	x	x	xxx	x	x	x
17 Piedras Blancas	SMCA	560, 561, 602	x	xx	xxx	xx	xx	xx
18 Cambria	SMCA	601, 602	x	xx	xx	x	xx	xx
19 Cambria	SMR	601	x	xx	xx	x	xx	xx
20 Point Buchon	SMCA	615	x	xx	xxx	xxx	xx	xxx
21 Purisima	SMCA	637	x	x	xx	x	x	x
22 Conception	SMP	643, 644, 657, 658	x	x	xx	x	x	xx
23 Area Charlie (San Nicholas)	SMR	813	x	x	xxx	x	x	xxx

x indicates presence of the species

xx indicates presence and commercial fishing of the species

xx* indicates presence and recreational fishing of the species

xxx indicates presence and commercial and recreational fishing of the species

APPENDIX 1: INDIVIDUAL MPA EVALUATIONS

SOUTHERN CENTRAL REGION

1. Año Nuevo State Marine Reserve

Description: Northern boundary is from Franklin Point to 1 nautical mile offshore at latitude 37° 8.9' N. Offshore boundary is 1 nautical mile from shore. Southern boundary is from first small point of land south of Waddell Creek to 1 nautical mile offshore at latitude 37° 4.7' N. This proposed area encompasses two marine regions.

Geomorphology/oceanography: This area is a major coastal headland. Proposed site includes both the exposed face and leeward protected face. Shelf offshore is wide and shallow. Area of intense and productive coastal upwelling, area to south may also be a site of coastal eddy.

Status: The area does not encompass an existing MPA site, but is adjacent to coastal terrestrial State Park with enforcement capability. Encompasses Area of Special Biological Significance (ASBS). It is a popular research and public education site.

Ecological significance: The site is comprised of habitats representative of this depth range and section of the coast (Table X). It is an important area for resident adult black rockfish, which have been heavily fished in central California in the past decade. It serves as a feeding area for marbled murrelets, and is a well-known pinniped haul-out site. Outlet for steelhead and coho salmon stream. It is recognized as the northern range limit for commercially abundant giant kelp.

Proposed regulations: No commercial or recreational fishing permitted.

Placement notes: The size and location of this reserve seems appropriate.

2. Año Nuevo State Marine Conservation Area

Description: This MPA extends directly offshore of the Año Nuevo State Marine Reserve. Northern boundary is from one nautical mile due west of Franklin Point at latitude 37° 8.9' N to 3 nautical miles offshore. Offshore boundary is 3 nautical miles from shore. Southern boundary is from one nautical mile due west from first small point of land south of Waddell Creek at latitude 37° 4.7' N to 3 nautical miles offshore. Inshore boundary is the offshore boundary of the proposed Año Nuevo State Marine Reserve. This proposed area encompasses two marine regions.

Geomorphology/oceanography: The site is comprised of habitats representative of this depth range and section of the coast. All other environmental characteristics are similar to those described for the Año Nuevo State Marine Reserve.

Proposed regulations: No commercial or recreational fishing permitted, except for salmon.

Placement notes: The size and location of this reserve seems appropriate.

10/17/01

3. Natural Bridges State Marine Reserve

Description: Western boundary is from Needle Rock (36° 57.4' N, 122° 6.3' W) along longitude 122° 6.3' W. Eastern boundary is from the eastern edge of Natural Bridges State Beach (36° 56.9' N, 122° 3.9' W) along longitude 122° 3.9' W. Offshore boundary is 1 nautical mile from shore.

Geomorphology/ocean graphy: This area is located in an “upwelling shadow,” so that larvae of some fish and invertebrates may be retained within the northern Monterey Bay area. It is representative of the shale reefs and kelp forests found along the coast between Santa Cruz and Davenport, and includes heavily-visited and well-studied tidepools at Natural Bridges State Park.

Status: The presence of a State Park and the laboratories for U.C. Santa Cruz and the National Marine Fisheries Service will facilitate enforcement of the reserve. There is a long-term monitoring program (PISCO) conducted within this site (Terrace Point) and a reference site to the north (Sandhill Bluff) of the proposed SMCA.

Proposed regulations: No commercial or recreational fishing permitted.

Placement notes: The 3.6 km length of this reserve is probably too short to guarantee that movement of fish does not jeopardize their vulnerability to recreational fishing. Because of the small area of this SMR and the allowance of recreational fishing in the adjacent SMCA, this SMR should be lengthened to the north approximately 4.8 km to Sand Hill Bluff, a recognizable coastal landmark. This extension would incorporate more of the northern boundary of giant kelp forests and create an overall SMR length of 8.5 km.

4. Natural Bridges State Marine Conservation Area

Description: Western boundary is from Table Rock (36° 58.1' N, 122° 8.1' W) due south along longitude 122° 8.1' W. Eastern boundary is from Point Santa Cruz (36° 57.1' N, 122° 1.5' W) due south along longitude 122° 1.5' W. Offshore boundary is 3 nautical miles from shore. Inshore boundary is the shoreline, except for that portion which is the offshore boundary of the proposed Natural Bridges State Marine Reserve.

Geomorphology/oceanography: Shale reefs and extensive kelp, sand bottom, rocky intertidal zone. Depth range 0-39 fathoms, or 0-70 meters. This area incorporates the benthic habitat and oceanographic conditions within the proposed Natural Bridges SMR, and also incorporates deeper soft-sediment habitats.

Status: This is a new proposed MPA, which will extend the proposed Natural Bridges SMR. As with the SMR, the presence of a State Park and the laboratories for U.C. Santa Cruz and the National Marine Fisheries Service will facilitate enforcement of the reserve. There is a long-term monitoring program (PISCO) conducted within this site (Terrace Point) and a reference site to the north (Sandhill Bluff) of the proposed SMCA.

10/17/01

Ecological significance: This area is located in an “upwelling shadow,” so that larvae of some fish and invertebrates may be retained within the northern Monterey Bay area. It is representative of the shale reefs and kelp forests found along the coast between Santa Cruz and Davenport, and includes heavily-visited and well-studied tidepools at Natural Bridges State Park. Since it is close to a port, recreational fishing would be allowed within the State Marine Conservation Area, and a buffer zone without commercial fishing would be provided around the Reserve.

Proposed regulations: No commercial fishing permitted except for salmon, albacore, sardine, anchovy, herring, and mackerel. Recreational fishing permitted.

As stated in the overall discussion on exemptions for pelagic transient species (see General Conclusion and Recommendations), anchovy, herring, and mackerel should be excluded from this exemption.

Placement notes: The presence of a State Park and the laboratories for U.C. Santa Cruz and the National Marine Fisheries Service will facilitate enforcement of the reserve. Because this SMCA allows recreational fishing, we recommend the northwestern boundary be extended 1.6 km to the northwest, contiguous with the northern boundary of our proposed extension of the inshore SMR.

5. Soquel Canyon State Marine Conservation Area

Description: A square delimited by a northern boundary latitude line of 36° 52' N, eastern boundary longitude line of 121° 57' W, southern boundary latitude line of 36° 48.3' N, and western boundary of longitude line 122° 2.2' W.

Geomorphology/oceanography: Submarine canyon with varied habitat, including vertical rock walls, rock outcrops, and soft sediment. Depth range 38-334 fathoms, or 70-611 meters.

Status: The area does not encompass an existing MPA site

Ecological significance: This area would include nearly all of one branch of the Monterey Submarine Canyon, and includes a variety of deep-water habitats. A natural refugium from fishing has been documented in this area, but it has otherwise been subject to fishing and shows signs of depletion. The habitat has been mapped, and the fishes have been surveyed by submersible. It is located within the Monterey Bay oceanographic system.

Proposed regulations: No commercial or recreational fishing permitted except for salmon, albacore, sardine, anchovy, herring, and mackerel.

Placement notes: The size and location of this reserve seems appropriate.

6. Portuguese Ledge State Marine Conservation Area

Description: A square delimited by a northern boundary latitude line of 36° 43.5' N, eastern boundary longitude line of 121° 55' W, southern boundary latitude line of 36° 41' N, and western boundary longitude line of 121° 58.5' W.

10/17/01

Geomorphology/oceanography: Rock reef and interspersed soft bottom. Depth range 48-112 fathoms, or 88-205 meters.

Status: This is a new proposed marine protected area.

Ecological significance: This area includes deep-water reef habitat that has been fished for decades. Surveys of this area by submersibles show that few large fish remain in the area. However, the previous fishery in the area and the surveys by submersibles show that the habitat will support populations of deepwater rockfish and other species, so it is a good site for recovery of these species. It is within the Monterey Bay oceanographic system.

Proposed regulations: No commercial or recreational fishing permitted except for salmon, albacore, sardine, anchovy, herring, and mackerel.

Placement notes: The size and location of this reserve seems appropriate.

7. Hopkins State Marine Reserve

Description: Existing Hopkins Marine Life Refuge, extended to base of Monterey Breakwater (36° 36.55' N, 121° 53.6' W), which is the eastern onshore corner, and out to the eastern offshore corner (36° 36.7' N, 121° 53.3' W) at a depth of 60 feet (20 m). The western onshore corner (36° 37.6' N, 121° 54.2' W) extends out to a depth of 60 feet (20 m), which is the western offshore corner (36° 37.6' N, 121° 54.4' W). The offshore boundary is at 60 feet depth (20 m).

Geomorphology/oceanography: Rock reef and interspersed soft bottom; kelp forests; rocky intertidal zone. Depth range 0-11 fathoms, or 0-20 meters

Status: The proposed MPA is an eastward expansion of the Hopkins Marine Life Refuge, which has been under some degree of protection since 1931, and has been totally protected since 1984. Extensive scientific studies have been carried out within the HMLR, and long-term monitoring sites have been established in the HMLR and off Cannery Row. The area off Cannery Row is a popular area for observation of marine life by kayakers and SCUBA divers. Its location off Hopkins Marine Station, the Monterey Bay Aquarium, and other public facilities will facilitate enforcement.

Ecological significance: The Monterey Peninsula is a northerly outpost for some southern California fishes.

Proposed regulations: No commercial or recreational fishing permitted.

Placement notes: As stated in the Reserve Size section, the proposed SMR is very small (0.9 km²), especially considering that the adjacent Pacific Grove SMCA allows recreational take. Like other reserves, the small area reflects the short distance to which the reserve extends offshore. Further extension offshore to a depth of 30 m (rather than 20 m) would incorporate more deep rocky reef habitat. This is recommended.

10/17/01

8. Pacific Grove State Marine Conservation Area

Description: Existing lateral boundaries of Pacific Grove Marine Gardens Refuge. Eastern onshore boundary is the proposed western boundary of Hopkins SMR out to 1 nautical mile (36° 38.29' N, 121° 54' W). The inshore boundary follows the curve of the land from the eastern onshore boundary around Pt. Piños to Asilomar. Southern onshore boundary (36° 37.08' N, 121° 56.46' W) out to 1 nautical mile (36° 37.47' N, 121° 58' W). Offshore boundary is 1 nautical mile from shore.

Geomorphology/oceanography: Extensive rock reef and interspersed soft bottom; kelp forests; extensive rocky intertidal zone. Depth range 0-37 fathoms, or 0-68 meters.

Status: This has been an MPA since 1984, and existing rules have been extended to the enlarged MPA. It serves as a buffer zone for the proposed Hopkins State Marine Reserve, but allows recreational fishing for finfish in an area that is protected from the weather and is accessible from shore. It is a popular area for the observation of marine life, and the site of many scientific studies.

Ecological significance: The Monterey Peninsula is a northerly outpost for some southern California fishes. Extension of the MPA to 1 mile from shore provides a degree of protection to extensive deeper reefs, as well as the extensive shallow reefs and kelp forests.

Proposed regulations: No commercial fishing except for salmon, sardines, mackerel, anchovy, squid, and herring, and kelp. Recreational fishing allowed for finfish only. Given the allowance of recreational finfishing and commercial kelp harvesting, it is unclear what the overall value of limiting commercial bottom fishing and recreational take of invertebrates is in this area and whether the SMCA provides a misleading sense of protection. This is not a “conservation area”.

Placement notes: Aside from the regulation concerns the size and location seems appropriate.

9. Carmel Bay State Marine Park

Description: Western boundary begins at Pescadero Point (36° 33.654' N, 121° 57.12' W) and continues in a straight line to Granite Point (36° 31.41' N, 121° 56.1' W) at compass bearing roughly southeast. All other boundaries of this reserve are bound by the coastline.

Geomorphology/oceanography: Rock reef and interspersed soft bottom; kelp forests; submarine canyon. Depth range 0-77 fathoms, or 0-141 meters.

Status: This area has been an MPA since 1976, and current levels of protection have been extended. This area covers a wide range of habitats, including rock reefs, sand bottom, and the head of the Carmel submarine canyon. It is a popular area for the observation of marine life, and the site of long-term monitoring sites and many scientific studies.

10/17/01

Ecological significance: The canyon head serves as a reserve for spot prawns, a species harvested commercially. The Monterey Peninsula is a northerly outpost for some southern California fishes, and Carmel Bay is oceanographically complex due to its proximity to both Monterey Bay and the Pt. Sur upwelling center.

Proposed regulations: No commercial fishing permitted. Recreational fishing allowed for all species except mollusks and crustaceans.

Placement notes: *The area of this reserve is constrained by the size of the Bay.*

10. Point Lobos State Marine Reserve

Description: Present boundaries of Point Lobos Ecological Reserve. Northeastern onshore boundary (36° 31.4' N, 121° 56.2' W) out to northeastern offshore boundary (36° 31.5' N, 121° 56.2' N). Northern boundary at a latitude line 36° 31.5' N to a western offshore boundary (36° 31.5' N, 121° 57.5' W). Southwest onshore boundary (36° 30.3' N, 121° 56.3' W) to a southwest offshore boundary (36° 30.9' N, 121° 57.9' W).

Geomorphology/oceanography: Extensive rock reef deep and shallow off Pt. Lobos and Yankee Point; extensive kelp forests; interspersed soft bottom; submarine canyon heads. Depth range 0-32 fathoms, or 0-59 meters.

Status: The Point Lobos Ecological Reserve has been in existence since 1974, and is a popular area for observation of marine life. It is adjacent to a state terrestrial reserve, so entry is monitored closely. It is the site of several surveys of fish and biota in both shallow and deep water, and a long-term monitoring site.

Ecological significance: The Pt. Lobos Ecological Reserve contains extensive reef and kelp-forest habitat, seabird roosts, and pinniped haul-outs. The proposed surrounding SMCA contains more of this habitat, as well as deeper reefs and canyon heads. This area is representative of the habitats found between Pt. Lobos and Pt. Sur. It is near the upwelling center at Pt. Sur, and to the circulation of Carmel Bay.

Proposed regulations: No commercial or recreational fishing permitted.

Placement notes: Given protection afforded this reserve by the surrounding SMCA, the size and location seems appropriate.

11. Point Lobos State Marine Conservation Area

Description: Northern inshore boundary latitude 36° 31.7'N from offshore northern corner of Point Lobos SMR extended west to 3 nautical miles. Southern boundary is at a unnamed point (36° 28.8' N, 121° 56.2' W) due west of the mouth of Malpas Creek, and east of the mouth of Malpas Creek at a latitude 36° 28.8' N. Inshore boundary is the shoreline, except for that portion which is the offshore and southern boundary of the proposed Point Lobos State Marine Reserve. Offshore boundary is 3 nautical miles from shore.

10/17/01

Geomorphology/oceanography: Extensive rock reef deep and shallow off Pt. Lobos and Yankee Point; extensive kelp forests; interspersed soft bottom; submarine canyon heads. Depth range 0-290 fathoms, or 0-530 meters.

Status: This is a new proposed marine protected area

Ecological significance: The proposed area would serve as a buffer zone for Pt. Lobos State Marine Reserve and would provide extensive protection for bottom-associated fishes, particularly rockfishes. The proposed area contains extensive reef and kelp-forest habitat, seabird roosts, and pinniped haul-outs, as well as deeper reefs and canyon heads. This area is representative of the habitats found between Pt. Lobos and Pt. Sur. It is near the upwelling center at Pt. Sur, and to the circulation of Carmel Bay.

Proposed regulations: No commercial or recreational fishing permitted except for salmon, albacore, sardine, anchovy, herring, mackerel, and, by trap only, spot prawns.

Placement notes: The size and location of this reserve seems appropriate.

12. Point Sur State Marine Conservation Area

Description: Northern boundary is a latitude line 36° 18.4' N from Point Sur (36° 18.4' N, 121° 54.1' N) to 3 nautical miles offshore. Southern boundary is a latitude line 36° 16.5' N from unnamed point onshore (36° 16.5' N, 121° 50.9' W) to 3 nautical miles. Offshore boundary is 3 nautical miles from shore.

Geomorphology/oceanography: Extensive rock reef deep and shallow; extensive kelp forests; interspersed soft bottom. Depth range 0-42 fathoms, or 0-77 meters.

Status: This is a new proposed MPA.

Ecological significance: Point Sur is an upwelling center, from which larvae of fish and invertebrates may be transported to other areas. Because the reserve extends south of the Point, some larval retention may also occur, contributing the self-replenishment or enhanced recruitment to this site. This site and nearby areas of similar habitat are exploited by commercial and recreational fisheries. It is adjacent to Andrew Molera State Park, and near a long-term monitoring site.

Proposed regulations: No commercial or recreational fishing permitted, except for salmon, albacore, sardine, anchovy, herring, and mackerel.

Placement notes: The size and location of this reserve seems appropriate.

13. Julia Pfeiffer Burns State Marine Reserve

Description: Northern boundary is a latitude line 36° 10.5' N from Partington Point (36° 10.5' N, 121° 41.9' W) to 1 nautical mile. Southern boundary is a latitude line 36° 9.2' N from Anderson Canyon (36° 9.2' N, 121° 40' W) to 1 nautical mile. Offshore boundary is 1 nautical mile from shore.

10/17/01

Geomorphology/oceanography: Rocky intertidal; rock reefs and interspersed sand in shallow water; submarine canyon heads, kelp forests. Depth range 0-137 fathoms, or 0-251 meters.

Status: This area extends the protection of the Julia Pfeiffer Burns State Park. Existing regulations prohibit the commercial and recreational take of certain invertebrates and the recreational take of kelp only.

Ecological significance: Most of this area has been designated as an underwater park, for its underwater topography and excellent diversity of marine life. It is adjacent to a terrestrial state park. Surveys of the marine life in this area have been conducted by the State Parks department in designating it an underwater park. This and the Big Creek reserve will serve as replicated no-take areas within a region of similar habitat and oceanography. It is located between upwelling centers.

Proposed regulations: No commercial or recreational fishing permitted.

Placement notes: Although this reserve is small in area, the rapid increase in depth from shore effectively protects the ecosystem offshore along the length of this reserve. Extending the length of this reserve along the coast may be warranted. However, the southern boundary is in close proximity to the Big Creek reserves and the northern boundary is defined by a well recognized coastal feature (Partington Point). If a well recognized shore feature exists 2 km to the north, this small increase in length may increase protection for mobile species (especially finfishes) and increase self-replenishment of sessile invertebrates (e.g., abalone) within this reserve.

14. Big Creek State Marine Reserve

Description: Northern boundary is a latitude line of 36° 5.3' N from onshore point (36° 5.3' N, 121° 37.1' W) out to northern offshore corner (36° 5.3' N, 121° 37.9' W). Southern boundary is a latitude line of 36° 3.6' N from onshore point (36° 3.6' N, 121° 35.5' W) out to southern offshore corner (36° 3.6' N, 121° 36.4' W). Offshore boundary is 50 fathoms depth.

Geomorphology/oceanography: Extensive rock reef deep and shallow; extensive kelp forests; interspersed soft bottom; submarine canyon heads. Depth range 0-50 fathoms, or 0-92 meters. This MPA is south of the Pt. Sur upwelling center, and just north of a small upwelling center at Lopez point.

Status: This area is currently designated as the Big Creek Marine Resources Protection Act Ecological Reserve. There would be no change in regulations.

Ecological significance: This would continue the protection of The Big Creek Marine Resources Protection Act Ecological Reserve, which has existed since 1994, and is the site of monitoring studies in both deep and shallow water. A large and diverse intertidal system occurs at Gamboa Point.

Proposed regulations: No commercial or recreational fishing permitted.

10/17/01

Placement notes: This reserve seems very appropriately sized and placed, given the regulations for no recreational fishing in the surrounding SMCA.

15. Big Creek State Marine Conservation Area

Description: Northern boundary is from Rat Creek (36° 5.5' N, 121° 37.1' W) at latitude line 36° 5.5' N to 3 nautical miles offshore. Southern boundary is from Gamboa Point (36° 3.0' N, 121° 35.4' W) at latitude line 36° 3.0' N to 3 nautical miles offshore. Inshore boundary is the shoreline, except for that portion which is the offshore, northern and southern boundary of the proposed Big Creek State Marine Reserve.

Geomorphology/oceanography: Extensive rock reef deep and shallow; extensive kelp forests; interspersed soft bottom; submarine canyon heads. Depth range 0-399 fathoms, or 0-729 meters. This MPA is south of the Pt. Sur upwelling center, and just north of a small upwelling center at Lopez point.

Status: This is a new proposed marine protected area.

Ecological significance: A large and diverse intertidal system occurs at Gamboa Point.

Proposed regulations: No commercial or recreational fishing permitted except for salmon, albacore, sardine, anchovy, mackerel, and herring.

Placement notes: This would serve as a buffer zone for The Big Creek Marine Resources Protection Act Ecological Reserve has existed since 1994, and is the site of monitoring studies in both deep and shallow water. The proposed State Marine Conservation area extends the north and south boundaries to more easily-recognized points, and extends protection of benthic species to deeper water. This MPA leaves Lopez Point and other reef areas near the coastal access at Mill Creek open for fishing. The size and location seems appropriate.

16. Salmon Creek State Marine Reserve

Description: Northern boundary is a latitude line of 35° 49.9' N from White Rock #1 to 1 nautical mile offshore. Southern boundary is a latitude line of 35° 48' N from White Rock #2 to 1 nautical mile offshore. Offshore boundary is 1 nautical mile from shore.

Geomorphology/oceanography: Rock reef and kelp forest, interspersed with sand bottom. Depth range 0-24 fathoms, or 0-44 meters. It is south of a small upwelling center at Cape San Martin

Status: This is a new proposed MPA, but it encompasses an existing Area of Special Biological Significance, which provides water quality protection.

Ecological significance: This small proposed state marine reserve overlaps with an existing Area of Special Biological Significance, and includes shallow-water reef and kelp habitat. It is south of a small upwelling center at Cape San Martin

10/17/01

Proposed regulations: No commercial or recreational fishing permitted

Placement notes: This proposed area provides a MPA in the region between the Big Creek and Piedras Blancas MPAs. Because of the small area of this reserve (9.6 km²) and the short distance it extends offshore (1 mile), further extension from shore by 1 mile seems necessary. This would extend protection to the 80 m isobath. The depth range of many of the species targeted for protection within reserves extends to this depth. The extension offshore also creates a buffer for species at shallower depths.

17. Piedras Blancas State Marine Conservation Area

Description: Northern boundary is latitude line 35° 41.2' N from Hearst Castle Rock (35° 41.2' N, 121° 17.3' W) out to 3 nautical miles. Southern boundary is latitude line 35° 39.1' N from a unnamed point (35° 9.1' N, 121° 14' W) south of Point Piedras Blancas out to 3 nautical miles. Offshore boundary is 3 nautical miles from shore.

Geomorphology/oceanography: Extensive and popular intertidal zone; rock reef and kelp forests, with interspersed soft bottom. Depth range 0-54 fathoms, or 0-99 meters.

Status: This is a new proposed marine protected area.

Ecological significance: The region between Pt. Piedras Blancas and the coast to the south includes a rocky intertidal region that has been the subject of study for over 50 years, including ongoing monitoring studies. Elephant seals have established a new haul-out site in this area. Extensive areas of reef and kelp occur offshore, and some subtidal surveys have been conducted there.

Proposed regulations: No commercial or recreational fishing permitted, except for salmon, albacore, sardine, anchovy, herring, and mackerel.

Placement notes: The proposed Piedras Blancas SMCA complements the proposed Cambria SMCA and SMR in a region where nearshore fisheries have been heavily utilized. The location and size of the proposed reserve seem appropriate.

18. Cambria State Marine Conservation Area

Description: Northern boundary is a latitude line 35° 35.8' N from Pico Rock (35° 35.8' N, 121° 7.7' W) out to 3 nautical miles. Southern boundary is a latitude line 35° 32.4' N from Von Helm Rock (35° 2.4' N, 121° 5.4' W) out to 3 nautical miles offshore. Offshore boundary is 3 nautical miles.

Geomorphology/oceanography: Rock reef and kelp forests, with interspersed soft bottom. Depth range 0-47 fathoms, or 0-86 meters.

Status: This is a new proposed marine protected area.

Ecological significance: The region between Pt. Estero and Pt. Piedras Blancas contains extensive reef and kelp habitat, and has been heavily utilized by commercial and recreational fisheries.

10/17/01

Proposed regulations: Recreational fishing is permitted. No commercial fishing is permitted, except for salmon, albacore, sardine, anchovy, herring, and mackerel.

Placement notes: The proposed Cambria SMCA includes a launch site that has been traditionally used by recreational fishermen, and more recently by commercial fishermen. By allowing recreational but not commercial fishing within the proposed SMCA, recreational and commercial fishing can be partitioned spatially, and the effects of recreational and recreational plus commercial fishing can be evaluated. The proposed Cambria SMR (see below) provides an additional area, subject to no fishing, for comparison. However, the relative area of the SMR and SMCA seems disproportionate. Extending the Cambria SMR northward into this SMCA would provide for better comparisons and lengthen the shorter SMR (see next section).

19. Cambria State Marine Reserve

Description: Northern boundary is the southern boundary of the proposed Cambria State Marine Conservation Area latitude line 35° 32.4' N from Von Helm Rock (35° 32.4' N, 121° 5.4' W) out to 3 nautical miles offshore. Southern boundary is latitude 35° 31' N from unnamed point (35° 31' N, 121° 04' W) out to 3 nautical miles. Offshore boundary is 3 nautical miles from shore.

Geomorphology/oceanography: Rock reef and kelp forests, with interspersed soft bottom. Depth range 0-54 fathoms, or 0-99 meters.

Status: This is a new proposed marine protected area.

Ecological significance: The region between Pt. Estero and Pt. Piedras Blancas contains extensive reef and kelp habitat, and has been heavily utilized by commercial and recreational fisheries.

Proposed regulations: No commercial or recreational fishing permitted.

Placement notes: The proposed Cambria SMCA (see above) includes a launch site that has been traditionally used by recreational fishermen, and more recently by commercial fishermen. By allowing recreational but no commercial fishing within the proposed SMCA, recreational and commercial fishing can be partitioned spatially, and the effects of recreational and recreational plus commercial fishing can be evaluated. The proposed Cambria SMR provides an additional area, subject to no fishing, for comparison. The proposed Cambria SMR is located adjacent to a University of California natural reserve, and a long-term marine monitoring site has been established here. Although the area of the Cambria SMR is substantial (17.8 km²), the length of this reserve is short (3.3 km) and the adjacent SMCA allows recreational fishing. Extending this SMR northward 2 km to a clearly identified coastal feature at the cost of the adjacent SMCA would be more in line with restrictions along other portions of this region.

20. Point Buchon State Marine Conservation Area

10/17/01

Description: Northern boundary is at latitude 35° 14.5' N from R'2" F1R6 Whistle, onshore point (35° 14.5' N, 120° 53.4' W) out to 1 nautical mile. Southern boundary is at latitude 35° 12.6' N from unnamed rock (35° 12.6' N, 120° 51.3' W) at Diablo Cove out to 1 nautical mile. Offshore boundary is 1 nautical mile from shore.

Geomorphology/oceanography: Rock reef and kelp forests, with interspersed soft bottom; offshore pinnacles. Depth range 0-27 fathoms, or 0-49 meters.

Status: This is a new proposed marine protected area.

Ecological significance: This area of extensive rock reefs represents the region of rock habitat between Pt. Buchon and Pt. San Luis. This region has been heavily utilized by recreational and commercial fisheries. Considerable biological and oceanographic information about the region has been gathered in this region for over 25 years as monitoring for the Diablo Canyon nuclear power plant.

Proposed regulations: No commercial or recreational fishing permitted, except for salmon, albacore, sardine, anchovy, herring, and mackerel.

Placement notes: This reserve is one of the smaller and shorter MPAs proposed. The location of the southern boundary of the proposed SMCA off Diablo Canyon was designed to take advantage of the northern monitoring sites for Diablo Canyon. The proposed northern boundary of this MPA falls south of Point Buchon. Extending the northern boundary of this SMCA 2 km northward (extending just around the Point) incorporates all of the Point as well as the kelp stand that extends north of and is contiguous with the stand within the proposed boundaries.

21. Purisima State Marine Conservation Area

Description: Northern boundary is latitude 34° 45.3' N from Purisima Point (34° 45.3' N, 120° 38.2' W) out to 1 nautical mile. Southern boundary is latitude 34° 41.6' N from an unnamed onshore point (34° 41.6' N, 120° 36.1' W) which is the north of Ocean Beach Park at the Santa Ynez River. Offshore boundary 1 nautical from shore.

Geomorphology/oceanography: Rocky intertidal and rock reefs characteristic of the region; kelp forests, soft bottom. Depth range 0-17 fathoms, or 0-31 meters.

Status: This is a new proposed marine protected area.

Ecological significance: The area surrounding Point Conception is of great biological value because it is the transition between the biotas of central and southern California. In addition, the area near Purisima Point is one of the few areas of reef and kelp between Point San Luis and Point Conception, and the reef areas there support a somewhat distinct assemblage of species. Brown rockfish is targeted in fisheries here, as well as rock crab offshore of the proposed MPA.

Proposed regulations: No commercial or recreational fishing permitted, except for finfishing by hook-and-line from shore. Finfishing from shore would be allowed to accommodate personnel stationed at Vandenberg Air Force Base.

10/17/01

Placement notes: This area is one of few in the Point Conception area with giant kelp. The location and size of this reserve seems appropriate.

22. Conception State Marine Park

Description: Northern boundary is latitude 34° 36.3' N from Point Pedernales (34° 36.3' N, 120° 38.3' W) out to 3 nautical miles offshore. Eastern boundary is longitude 120° 27' W from Government Point (34° 26.8' N, 120° 27' W). This proposed State Marine Park is in both the South Central and Southern California Region.

Geomorphology/oceanography: Rock reef, sandy bottom, and kelp beds. Cultural artifacts (shipwrecks). Depth range 0-77 fathoms, or 0-140 meters

Status: The proposed MPA would expand the Vandenberg Marine Resources Protection Act Ecological Reserve. It would allow finfishing from shore within the existing Vandenberg MRPA Ecological Reserve, which is currently prohibited. It would prohibit fishing in the proposed expanded area.

Ecological significance: The area surrounding Point Conception is of great biological significance. It is one of the world's most striking biogeographic boundaries marking the abrupt transition from cold water species from the north (Oregonian province) to warm water species from the south (California province). The region of overlap in this proposed state marine park includes a unique mix of species that is not found anywhere else along the Pacific coast. The sharp transition in species arises from the collision of ocean currents. The cold, nutrient rich waters of the southward flowing California Current collide with the warmer, nutrient poor waters of the Santa Barbara Channel in the vicinity of Point Conception. The region between Point Arguello and Point Conception is characterized by extensive upwelling during the spring and summer because of the strong, persistent north winds. Extensive research has been done on the biology and oceanography of coastal ecosystems around Pt. Conception, including many long-term studies. These databases will enable detailed evaluations of reserve effectiveness. The sensitivity of this region to human disturbance is greatly accentuated, because the settlement of young fish and invertebrates to the region is chronically low, probably due to the strong surface currents moving offshore due to the intense upwelling. As a result, populations in this region may be especially sensitive to human disturbance. The direction of ocean circulation in this region also suggests that young produced on the mainland coast in the Point Conception area may commonly be exported to the northern Channel Islands. The sensitivity of adult populations because of low larval settlement coupled with the likely importance of these populations as a source of young to island populations make this a critical area to reduce impacts. In addition to the special ecosystem features of this region, there are substantial culturally important features of the proposed state marine park, including several historically important shipwrecks.

Proposed regulations: No commercial fishing permitted. No recreational fishing permitted except for finfish by hook and line from shore.

10/17/01

Placement notes: In addition to its ecological significance, which determines the placement of this MPA, there is limited shoreline access, which makes this a low-use area. The effects on consumptive users should be minimal. Shore-based recreational finfishing around Jalama Beach and Boathouse are relatively common and will be permitted to continue in this marine park. The location and size of this reserve seems appropriate.

23. Area Charlie State Marine Reserve (San Nicolas Island)

Description: Navy “Area C” out to 3 miles. Western boundary from range markers at Dutch Harbor (33° 13.1' N, 119° 29.7' W) at longitude 119° 29.7' W out to 3 nautical miles. Northern boundary at East End Light (33° 13.8' N, 119° 25.3' W) at latitude 33° 13.8' N to 3 nautical miles. Offshore boundary is 3 nautical miles from shore.

Geomorphology/oceanography: Rocky reefs, kelp forests, and sand bottom. Depth range 0-389 fathoms, or 0-711 meters.

Status: This is a new proposed marine protected area. NOTE: This reserve does not intend to limit or restrict U.S. Military exercises in the region.

Ecological significance: The biota of San Nicolas Island is transitional between southern California and central California, because of its exposure to the California Current. This reserve provides protection for habitat that is representative of San Nicolas Island. Subtidal biological surveys have been carried out in the area of this reserve and at other sites on San Nicolas Island.

Proposed regulations: No commercial or recreational fishing permitted.

Placement notes: The proposed reserve protects a small proportion of the shallow rocky reef and kelp forest habitat, but includes the areas most heavily fished. The location and size of this reserve seems appropriate.